Department of Anthropology, The University of Texas at Austin
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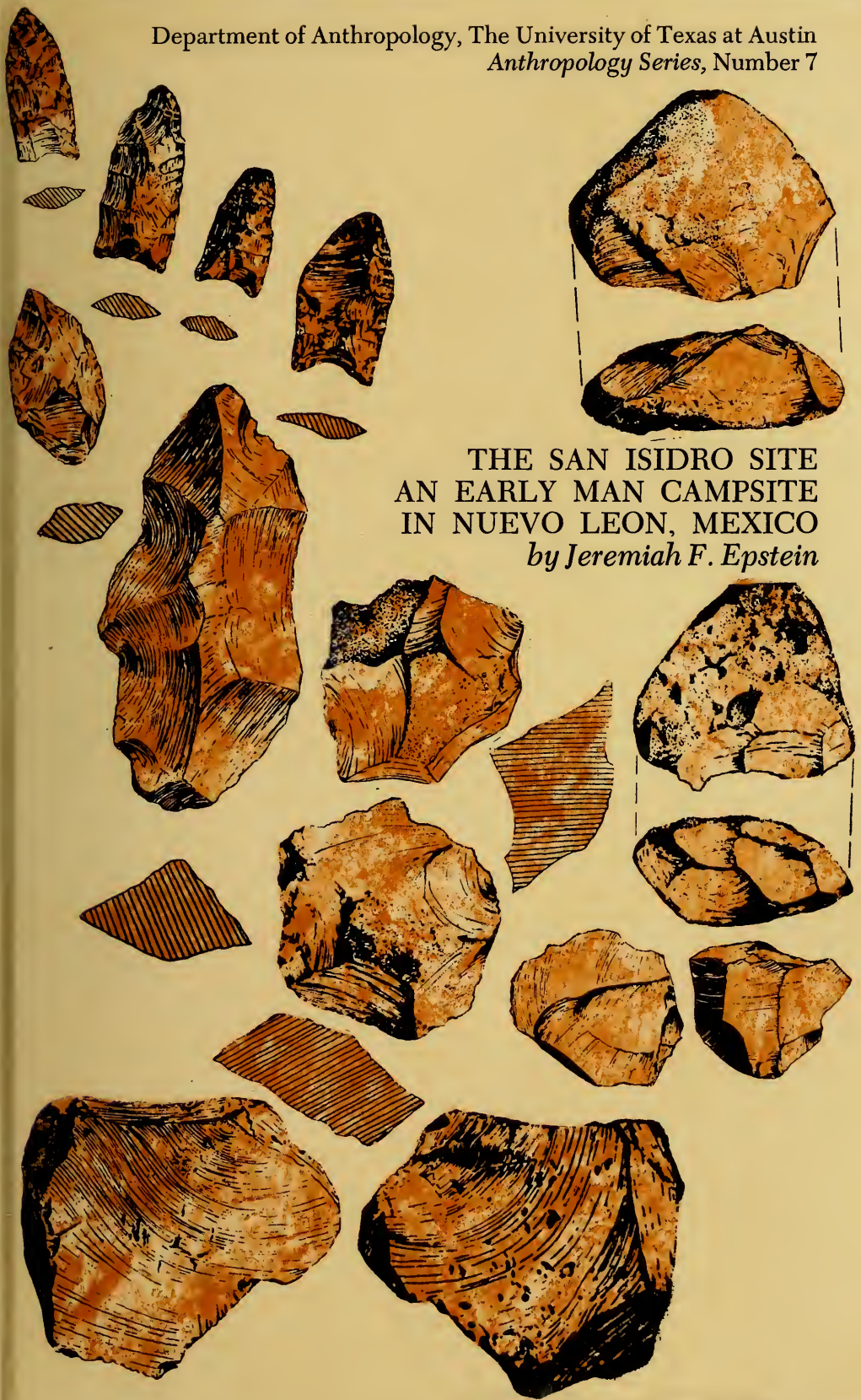

THE SAN ISIDRO SITE AN EARLY MAN CAMPSITE IN NUEVO LEON, MEXICO

by Jeremiah F. Epstein

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Abstract

The San Isidro Site is an open camp site in Nuevo Leon Mexico. Most of the data for the definition of culture complexes and chronology at the site derive from a technological and distributional analysis of the surface material. Three occupation periods are inferred. The earliest is characterized by artifacts made by heavy percussion, and include pebble tools, bifaces and unifaces. It is quite probable that some thinned bifaces were made at this time, but they have not been identified. These forms continue into the second occupation which is marked by the introduction of Clear Fork Gouges and projectile points of Plainview and Lerma types. The last period is represented by scattered materials of early, middle, and the late Archaic cultures.

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Miriam Lundy, Kay Sutherland, and Larry Wilkinson. Robert Whallon, then a graduate student in anthropology at the University of Chicago, was field foreman. This gallant crew arose every morning at 3:30 to work in the hot, open country of northeastern Mexico, where there was no shade and the temperatures often reached 100 degrees Fahrenheit by 10:30 A.M. Many of their observations on the site and its assemblage are directly or indirectly incorporated in this report.

The excellent line drawings of the artifacts were done by R. Powell St. John, a graduate student in the Department of Anthropology, University of Texas.

During the course of our survey and excavations we benefited from the suggestions of many colleagues. Those who were kind enough to visit our site included, from I.N.A.H., Prof. Jose Luis Lorenzo, and Sras. Beatriz Braniff, M.A. Cervantes, and Antonieta Espejo, and from the University of Texas, Dr. Ernest Lundelius of the Department of Geology, and Drs. E. M. Davis and Edward B. Jelks of the Department of Anthropology. Dr. Paul S. Martin of the Laboratory of Tree Ring Research, University of Arizona analyzed our pollen samples, and Dr. M. C. Johnston of the Department of Botany, University of Texas, and Dr. Paulino Rojas of the Instituto Tecnologico de Estudios Superiores de Monterrey reviewed our study of the botany of the San Isidro area. Drs. T. N. Campbell and E. M. Davis of the Department of Anthropology, University of Texas edited this report, and I am grateful to them for their constructive criticisms.

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Introduction

The San Isidro Site (N.L. 37), the subject of this report, was discovered during the course of an archaeological survey of northeastern Mexico made in the summer of 1960. The site seemed important enough at that time to justify more extensive investigation, and so we returned to it two years later with a field crew composed of students who were enrolled in the Department of Anthropology, University of Texas, field course in archaeology.

The archaeological survey which resulted in the discovery of San Isidro was largely conceived by Dr. William Madsen, then of the Department of Anthropology, the University of Texas, and by Prof. Wigberto Jimenez Moreno, of the Departamento de Investigaciones Historicas of the Instituto Nacional de Antropología e Historia, Mexico. The then newly formed Centro de Investigaciones Sociales, A.C. (CISAC) agreed to sponsor the survey, and the work was made possible by grants from the Department of Anthropology, the Institute of Latin American Studies, and the Excellence Fund of the University of Texas. The Instituto Tecnologico de Estudios Superiores de Monterrey supplied office, laboratory, and storage space, and through its good offices expedited the work of the survey in innumerable other ways.

The writer spent the period between June 9th and August 30th of 1960 in the field. Most of the survey was devoted to Nuevo Leon, but some time was spent in eastern Coahuila and northwestern Tamaulipas. As a result of the summer's work, collections were made from 71 localities, 43 of which were in Nuevo Leon, 26 in Coahuila, and 2 in Tamaulipas (see Appendix 1). By far the most significant discovery was the San Isidro Site which was found towards the end of the survey period. The site not only appeared to be early, but also seemed to have a lithic complex and a location which contrasted greatly with the sites I had seen previously.

Almost all of the localities discovered during the 1960 reconnaissance

were open sites, usually near a stream, and marked by zones of burned rock lying on the surface. The rocks were generally gravels, and presumably came from the bed of nearby arroyos. In some places burned rocks border the edges of arroyos in a sinuous band, often 20 yards wide and 3 to 5 miles long. Distributed throughout these areas are occasional circular concentrations of rock, 3 to 4 feet in diameter, that in this paper are referred to as hearths.

The most obvious differences between open sites in Nuevo Leon is seen in those sites that are located in the lowlands east of the Sierra Madre Oriental and those that occur in the highlands to the west. The highlands sites are marked by large quantities of a fine white flint which was used extensively for chipped stone artifacts, while black flint of uneven quality was the stone characteristically used in the lowlands. In both areas the most common artifact is the projectile point, followed in frequency by small, rather crudely made bifaces (see Appendix 1). Unifacials, which are, for example, so very common in Texas, are relatively infrequent in the sites that I had discovered.

The San Isidro Site was different. Instead of being near an arroyo or a stream, it was 7 kilometers south of the nearest source of water, the Rio Ayancual. Instead of small artifacts made of flint, most of the chipped stone assemblage consisted of large specimens made from a patinated silicified limestone. While projectile points were the most frequently encountered artifacts at the other sites, at the San Isidro Site projectile points were rare, and were largely of early types. Some idea of the low frequency of projectile points at the San Isidro Site can be gained by considering the time involved in collecting them. At most sites I was able to gather from two to ten points within an hour. Fifteen man-hours were spent at San Isidro by myself, Don Spence, and William Griffin, my companions on the day we discovered the site, without discovering a single point. The fourteen points and point fragments that were finally collected from San Isidro by the end of the summer resulted from the combined efforts of E. Mott Davis, Edward B. Jelks, Professors Eugenio del Hoyo and Luis Astey, and Ing. Eduardo Barragan, all of whom spent a full day combing the ground.

An inspection of the San Isidro Site and the neighboring area was also made by Prof. Jose Luis Lorenzo and Sras. Beatriz Braniff and Marie Antoniette Cervantes of the Instituto Nacional de Antropologia e Historia. In the course of their four-day visit, it was discovered that

the region contained other localities with assemblages of pebble tools and heavy bifaces. One such locality, called La Puntita Negra, yielded the distal frogment of a fluted point and the only burin-faceted projectile point recovered during the survey (Epstein 1961).

Shortly before Prof. Lorenzo left for Mexico City we discussed the possibility of more extensive work at San Isidro. We recognized that a good portion of the site had been exposed by sheet erosion, but there were also some areas where erosion was not apparent. It was hoped that excavations made in these undisturbed areas might recover enough artifacts in association with geological deposits and charcoal to provide the ecological and chronological data so necessary for site interpretation. We agreed that the digging of San Isidro might well turn up nothing of consequence, but the site seemed to be important enough to give it a try.

Encouraged by the success of the 1960 season, we made plans for a five-year archaeological program in Northeastern Mexico. Permission to work in this area from June 1, 1962 to May 31, 1967, was granted by the Mexican government through Dr. Roman Piña Chan of the Instituto Nacional de Antropologia e Historia. Funds for the first year were supplied by the Graduate School and the Institute of Latin American Studies of the University of Texas. The National Science Foundation granted funds to continue the project for the remaining four years.

CHAPTER I

Site Description

The San Isidro Site is located 40 miles east of Monterrey (see figure 1) at an approximate elevation of 750 feet above sea level. Highway 40, which connects Monterrey with the border city of Reynosa, cuts through the middle of the site.

About 300 yards north the highway is a flat-topped shale ridge capped with a gravel conglomerate. A similar ridge occurs about 1.5 miles south of the highway. The site is on a large alluvial fan which extends from the north ridge to the center of the basin that lies between the two ridges. This basin is approximately 2 miles wide and 3 miles long. For all practical purposes, the San Isidro Site is confined to the area where cultural material is visible on the surface. This area begins with the slope immediately below the gravel ridge and extends about 350 yards south of the highway.

Because the ground slopes markedly close to the ridge, it is quite possible that the cultural material now on the surface had always been exposed. However, south of the road, where the slope is more gentle, the artifacts were at one time covered. They were seen eroding from the walls of the shallow wash a short distance from where we made our excavations (see Figure 2). There are two kinds of ground surfaces in the area immediately south of the road. The first is a silty clay. The second contains, in addition, scattered gravels ranging in size from fine to medium. Almost all of the surface artifacts we found came from the gravel areas.

The evidence of human occupation at San Isidro consisted of a series of chipped stone artifacts which were associated with clusters of red to dark brown rock fragments. The fragments appear to be fire-burned, and we are interpreting the clusters as hearths, although none contained charcoal. There were nearly a hundred hearths in the area of the

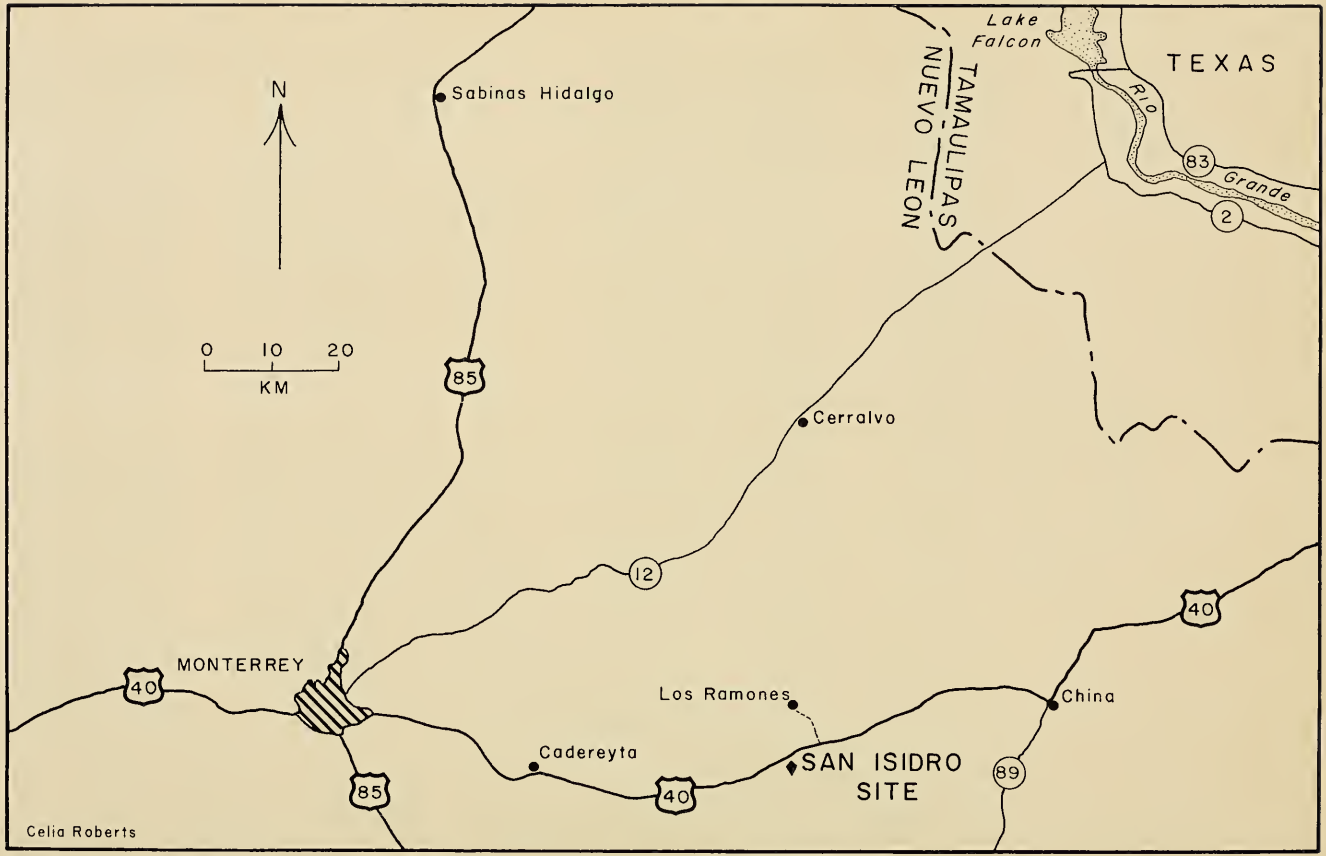

Fig. 1. May of Monterrey-Falcon area, showing location of San Isidro Site.

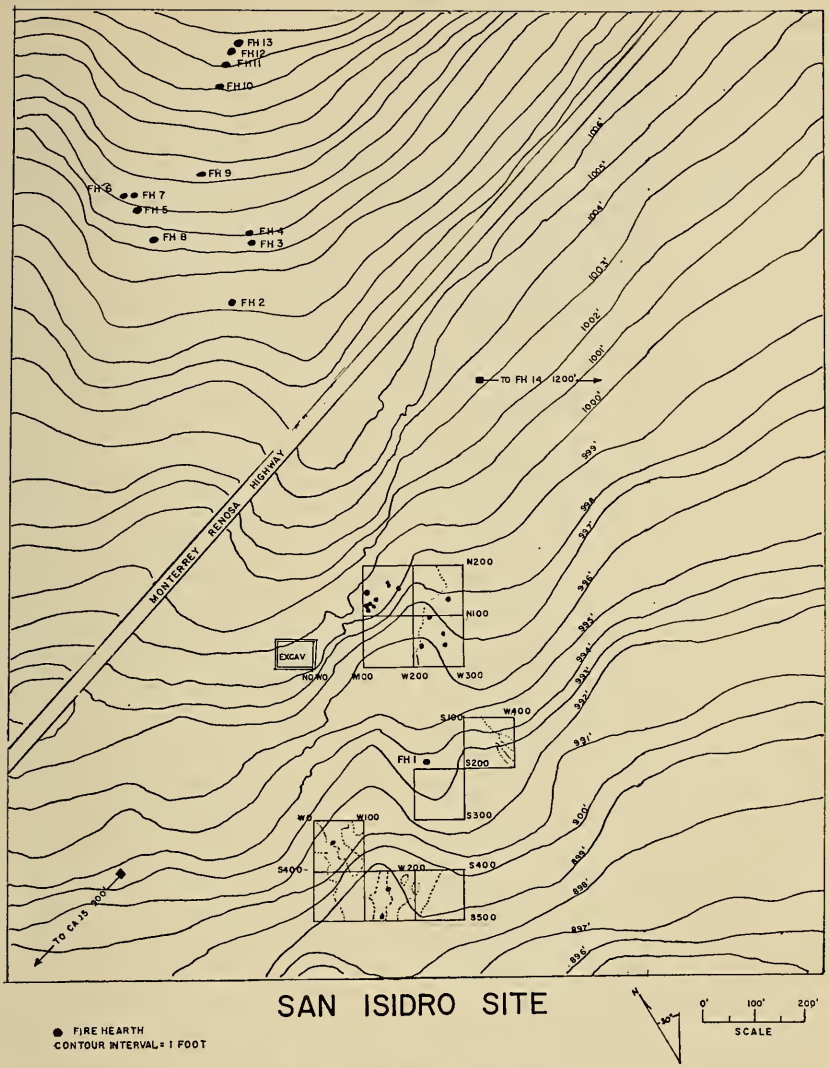

Fig. 2. Map of San Isidro Site.

site (we mapped only about 30 of them), and they were in various stages of preservation. Some could be seen as compact masses eroding from the walls of the shallow gullies or washes that ran through the site. In other instances, the rocks formed a concentration lying on the surface where they had apparently been exposed by sheet erosion. In

still other cases, the burned rocks were so thoroughly dispersed that no hearth could be singled out as a possible parent. These isolated fragments may have come from hearths that were exposed somewhat earlier than the others, and then were scattered by the horses, goats and cattle that were pastured in the area. Almost surely, however, a large number of hearths had been dispersed in ancient times, before the site was covered. This inference is based on the fact that we also obtained scattered fragments of burned rock in our excavations

Because the limits of the San Isidro Site are largely defined in terms of those areas that have not been subjected to soil erosion, the arbitrary nature of the site's boundary is apparent. As far as can be ascertained, localities similar to San Isidro extend east and north of the site for many miles. If there were a continuous zone of eroded soil between these localities, it would probably be hard to determine where one site ends and the other begins. In any case whether the boundaries of the site are due to natural agencies or to human activity, what we call the San Isidro Site consists of an area approximately 1,000 by 2,000 feet, within which are nearly one hundred clusters of burned rock and the scattered remains of many others. The presence of so many hearths in such a small area gives the impression that this immediate area was preferred over neighboring areas for a camp site.

The reason for this preference is not obvious, because the site is about 7 kilometers south of the Rio Ayancual, the nearest source of water today. However, if it were somewhat more humid in the past than now, the basin immediately south of the site would probably have contained some standing water, at least during the rainy season. In fact, when the site was first discovered, in the middle of August, the soil in the basin was damper than that nearer the site.

Some explanation of why the artifacts are associated with the gravel areas can be obtained by examination of the soil profile (see Figure 3). At the surface is a thin (0–3 inches) layer of pale, gray-brown, crumbly soil that forms a crust when dry. Directly below it is a more compact dark brown zone that is relatively high in humus. This zone extends from 3 to 15 inches below the surface, where it begins to blend into the extremely compact yellow "B" zone. Near the bottom of the humus zone are scattered fine to medium sized gravels mixed with small cleavage fragments of calcite. Most of the artifacts recovered during the excavations seem to lie within these gravels or, perhaps, slightly above

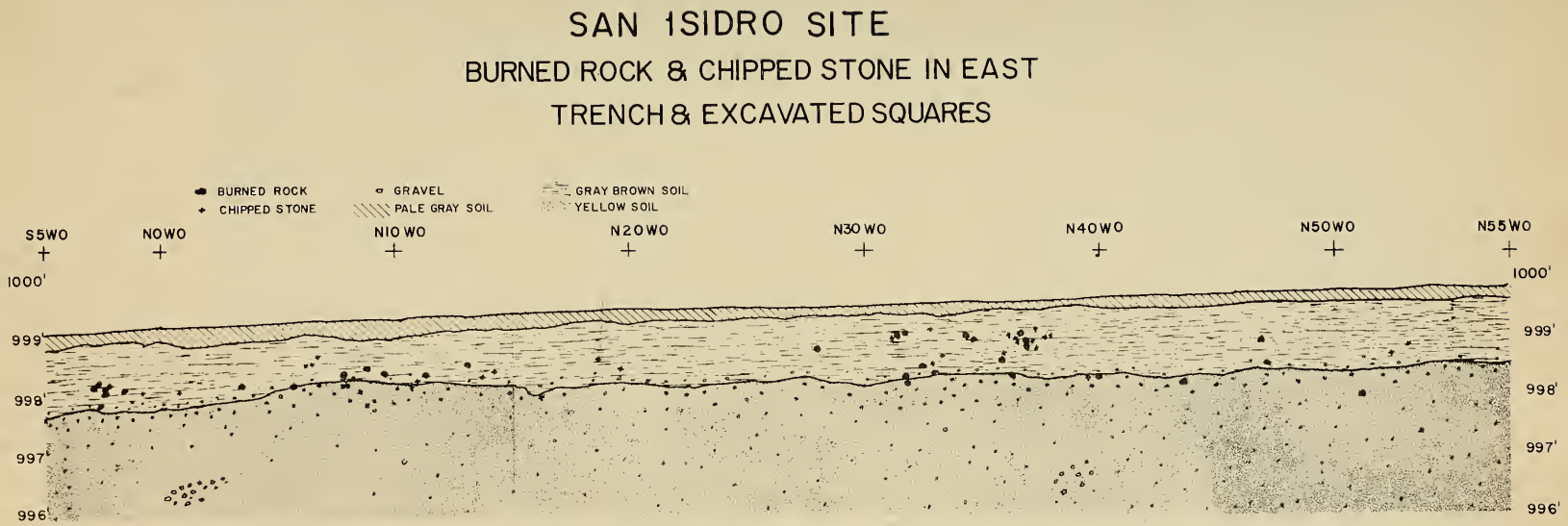

Fig. 3. Profile of W.O (east) trench and artifacts in it.

them. It would appear, therefore, that these gravels corresponds to the exposed areas of gravels and artifacts that were found south of the road. The silty clay regions which contain no artifacts correspond to the soils lying above the gravels in the profile.

The gravels may represent an older erosional surface assignable to a time when the flank of the North ridge was closer to the center of the basin. Later, as the ridge eroded northward, the ground was covered by a deposit of eroded material, which is now being exposed by erosion of the old alluvial fan. The present erosional pattern is one of headward erosion from the middle of the basin towards the hills, and is accompanied in some places by sheetwash.

The ridge which marks the northern boundary of San Isidro may have been an important factor in the choice of the site as a camp because it provides the nearest source of stone in the area. The gravels supplied the sandstone for the hearths, as well as for the black flint and fine-grained limestone from which the artifacts were made. These rocks are visible in the cemented gravel matrix that caps the ridge, and individual specimens that have weathered out can be picked up in abundance.

FIELD PROCEDURES

The strategy followed in our field work at the San Isidro Site was based to a large extent on how the site was interpreted before we began our work, and on the problems we hoped to solve. We had a surface collection, obtained in 1960, of heavy bifaces and pebble tools, as well as Lerma, Plainview and Matamoros points, and small bifaces of flint. They came from the area south of the road, and, although scattered over a wide expanse, seemed to be concentrated around hearths or areas of scattered burned rock. More than one occupation and time period were indicated, and it was hoped that the culture complexes at the site could be identified by some valid procedure instead of merely by guesswork. The open nature of the site, the scattered hearths and areas of burned rock, and the absence of any clearly defined occupation zones in the soil profiles seen in the nearby washes made us more pessimistic than hopeful about the success of the season's work.

Before the season began, I decided that a combination of excavation and detailed mapping of the artifacts exposed on the surface would be the best field procedure. It was hoped that excavations in an area

of no obvious sheet erosion would provide geological information relatable to the artifacts. Ideally, we hoped to get culture chronology, but we were willing to settle for much less. Some buried hearths, with enough charcoal for dating, would be most acceptable.

The surface mapping was prompted by the desire to get a large artifact sample for comparative purposes and the hope that some kind of functional or chronological data could be obtained by meticulous collecting. Although much of the site was exposed by sheet erosion, it appeared that relatively little horizontal movement had occurred. This impression was based on the facts that the hearths appeared to be intact (see Fig. 17 A), and that on more than one occasion we found fragments of the same artifact, all heavily patinated, close to one another on the surface. It was, therefore, reasoned that if the site was relatively undisturbed, we might be able to obtain some notion of artifact complexes by plotting the differential spatial distribution of artifact categories.

THE EXCAVATIONS

The main excavation block was approximately 250 feet south of the Monterrey-Reynosa highway. This area was chosen because it seemed to be undisturbed by sheet erosion and it showed promise of having an archaeological deposit. The relative lack of sheet erosion was indicated by the absence of the gravel or burned rock that we had observed in other areas where we had picked up artifacts. About 30 feet east of the excavation area was a shallow wash in which two hearths were exposed about five inches below the surface. We hoped to find additional hearths by digging near these two.

The excavation area consisted of a rectangle, 50 by 70 feet, divided into 10-foot squares. The shorter sides of the rectangle were in a line oriented 30 degrees east of magnetic north. In order to simplify naming of the coordinates, we disregarded the deflection and referred to the lines that ran from northeast to southwest as north-south lines. The same fiction was applied to the east-west lines. Each square was named after its coordinates in the southeast corner. Thus, the square in the extreme southeast corner of the block was called North 0/ West 0 (N0/W0), while the contiguous square on the north was named North 10/West 0 (N10/W0). The square adjoining N0/W0 on the west was therefore,

named North 0, West 10 (N/W10). After the block was laid out and the 10-foot squares were marked by tabs tied to stakes at all 10-foot coordinate points, a 5-foot-wide trench was marked out around the whole rectangle. All lines were establed with a transit.

Before excavations began, the heights of the coordinate points were measured for contour data. A large steel spike, approximately 2 feet long and 2 inches thick, was driven into the ground north of the excavation block. The top of this spike was used as a bench mark and given an arbitrary elevation of 1,000 feet. This datum point was used throughout the season for all measurements of depth and for all contour data. The elevations of the coordinates were obtained with a transit and level rod, and these same tools were used for measuring the depths of all artifacts and pieces of burned rock found in situ.

Our excavation area sloped gently from true north to south. The N0/W0 point had a height of 999.22 feet; the N50/W70 coordinate, a height of 1000.2 feet. This gave a slope of 0.87 feet for a linear distance (along the hypotenuse of our 50 × 70-foot rectangle) of 86 feet, or approximately 1 foot of slope for every 100 feet along the true north-south line.

Excavation of the main block began by digging the five-foot-wide trench around the 50 × 70-foot block. The trenching continued until three sides (along the N0, W0, and N50 lines) were carried down to an average depth of 3.5 feet. No single trench had the same depth throughout its length. The western ends of trenches N0 and N50 were only about 2 feet deep, while the eastern ends were almost 4 feet in depth. The southeastern corner of the excavation area was the deepest, reaching a depth of more than 5 feet.

There were two reasons for carrying down the trenches unevenly. In the first place, the earth was hard—so hard, in fact, that we realized we could not excavate the whole 50 × 50-foot block in a single field season. The soil, a heavy clay impregnated with caliche, was almost rock-like when dry. During the six weeks, we actually broke seven Army surplus pick-mattocks while digging. Secondly, during the course of our excavations, we had three days of heavy rain, which filled our trenches with water and forced us to dig in other trenches or in other parts of the same trench. The reason that the southeast portion of the excavation area was carried down deepest was largely a function of drainage. Be-

cause it was the lowest part of the original slope, it collected all of the water and needed to be deepened to evacuate the water.

Our trenches gave us the information we needed to interpret the site and its deposit (see Appendix 2, *Geology of the San Isidro Site,* by Wilkinson). The soil profile was a normal one, without any of the zonings or disconformities that I had hoped for. Although we found fragments of burned rock and a few flakes, there were no zones or concentrations of cultural material. Most important, our trenches revealed that all of the burned rock and chipped stone was confined to the first 1½ feet of the deposit.

A single exception to the last statement needs mention. Shortly after the first rain, Barbara Alford, a graduate student, found a unifacial Clear Fork Gouge in the water-filled trench along the N50 line. The gouge came from a depth of 2.4 feet. The specimen gave us hope of finding other artifacts at that depth, if not deeper. Because no other example of chipped stone or burned rock was recovered at that depth during the remainder of the season, it was assumed that the gouge had been washed into the trench from either the backdirt or the trench walls during the heavy rain.

After it was determined that the trenches could supply no significantly new information, we stopped work and cleaned and mapped the face along the West 0 line. Work began on the excavation squares after the profiles were completed.

Because cultural remains were exceptionally scarce, we decided to excavate in 10-foot squares. Although all the dirt from each square was to be screened, we hoped to find artifacts and burned rock in situ, so that these artifacts could be measured in. We were looking, in short, for floors, or for some indications of cultural stratification, even though no zones were visible in the trench walls. Because we were grasping for minutiae, we dug our squares in 3-inch levels. As it turned out, the soil proved to be so hard that we could not have excavated 6-inch levels any more rapidly than 3-inch levels, and so no time was lost by using this procedure. Digging in shallow levels also had other advantages. It made it easier to find and record things in situ and, since the cultural deposit was about a foot thick, we had four levels with which to work.

Each 3-inch level was excavated with picks, pick-mattocks, and shovels. The ground was so hard that a trowel was virtually useless. The

depth of each level was checked with the transit. When a level was completely excavated, the floor was swept clean and examined for features before going on to the next. It was possible for a group of two students and two laborers to complete about 1½ levels daily in a 10-foot square. In terms of cubic feet of earth, this is equivalent to excavating a 5-foot square to a depth of about 1½ feet daily. During the course of work, we managed to excavate only six squares, the deepest of which (Square N0/W0) was carried to a depth of 33 inches. Two squares (N10/W0 and N10/W10) were dug down to 21 inches, and two squares (N30/W0 and N30/W10) reached a depth of 18 inches. The shallowest excavation was carried out in Square N30/W20, which went down four levels, or only 12 inches.

Square NO/WO was the last 10-foot square to be excavated in the main block. Before work started, the south wall of the square, along the NO line, was scraped clean and sediment samples for pollen analysis were obtained from the profile at every 6-inch level below the surface. In addition, soil samples were obtained from each level excavated. Unfortunately, neither of these two procedures proved successful. The soil samples, which were saved for analysis upon return to Texas, were lost in transit. The samples for pollen analysis proved to contain too little pollen for a meaningful interpretation of the climate (Paul Martin, personal communication).

Towards the end of the field season, we shifted operations to a new locality. The area was in the northwest quadrant of a 100-foot square designated South 500/East 100. It was, thus, 500 feet south and 100 feet east of the NOWO point of the original excavation area. This square had been examined carefully by the survey crew, who had found three Plainview point fragments, and we hoped that further excavations would turn up more.

A 5-foot-wide trench, 40 feet long, was dug along the South 430 line, from E10 to E50. The trench varied from 1 to 3 feet in depth and produced virtually no data other than that all artifacts were either on the surface or within 6 inches of the surface. We excavated there primarily to increase our artifact sample. Nine squares (10 × 10 feet) were dug, none over 6 inches deep. The excavation produced the base of a Plainview point, which was found to join a tip which had been collected by the surface survey party. The only other artifact of importance was the tip of another projectile point. Both specimens came from Square S440/

E20. The nine squares produced slightly less than 200 specimens of chipped stone, of which almost all were very small flake fragments.

SURFACE SURVEY AND COLLECTION

Because most of the conclusions in this report rest upon information associated with the artifacts recovered during the surface survey, a discussion of the surface collecting procedure is in order. Most of the techniques discussed below were developed by Robert Whallon, who was in charge of surface collecting (see Whallon, n.d.).

The surface survey and collecting methods used at San Isidro were devised in the hope than an analysis of the spatial distribution of artifacts would reveal cultural differences of some kind. If, for example, a group with its own distinctive culture camped in one part of the site, we might be able to distinguish this culture by a careful analysis of horizontal distributions. As noted earlier, much of the site gave the appearance of being uncovered by sheet erosion, but otherwise disturbed very little, Sheet erosion would naturally result in the mixture of older and more recent materials, if there had been any superimposition on that spot originally. We were hoping that such superimposition was minimal.

The hearths gave promise of being most revealing. Many were so well preserved that even the separated fragments of fire-cracked rock still maintained their original position relative to the whole. Each hearth seemed to represent a short period, a single night's fire or at most a fire kept burning for, perhaps, a week. As such, we could treat each hearth as if it were a separate camp and collect accordingly.

In the surface survey we experimented with various collecting procedures. The region south of the highway, called Area South, was marked off in 100-foot squares, and collections were made from eleven such squares. North of the highway, in Area North, we collected material from twelve separate hearths. An additional collection was made from a hearth east of the site (Hearth 14). As a check of our method, a collection also was made from an area of exposed artifacts and gravels west of the site (Control Area 15).

The techniques used in collecting from the 100-foot squares varied. Originally it was hoped that we could make a map showing every single artifact in its original location. As it turned out, we could map only two of eleven squares in this fashion (S500/E100 and S400/E100); the time

spent in recording and mapping each specimen, even with an alidade, proved much too costly. It was, therefore, decided that each 100-foot square would be divided into quadrants and collections made from each quadrant. Because most of the artifacts were found mixed with gravels, the provenience record of each specimen would include a statement of the type of soil in which the artifact was found, and the squares would be mapped in terms of the presence or absence of gravel areas. Although mapping most of the squares by quadrants is far from precise, we felt that this was the best procedure possible in the limited time available.

The hearths were mapped in concentric circles of increasing diameter. Collections were made from the hearths, starting with a circle of 4-foot radius, and then increasing the radius by intervals of 4 feet until radius of 32 feet was reached. Artifacts found around the hearth were noted as belonging to the circle of 12–16 foot radius, 20–24 foot radius, etc. Maps were not made of any hearth.

In retrospect, this technique for collecting from the hearths left much to be desired. In recording the data by circles rather than by quadrants or precise provenience, we failed to obtain any information about how our artifacts lay in relation to each other and to the prevailing winds. The whole collecting procedure was based on the assumption that a hearth represented a single unit, a relative instant in culture history. By extending the hearth collections to a radius of 32 feet, it was felt that he limit of this unit was reached, if not exceeded (see Hearth Complex, Chapter 3).

SUMMARY OF FIELD PROCEDURES AND INTERPRETATIONS

Our excavations at San Isidro produced very few artifacts, but they allowed us to interpret some aspects of the geological and climatological conditions involved in the history of the site. The basic geological statement is given in Appendix 2 by Wilkinson. The excavations in the main block indicated that artifacts and burned rock formed an irregular deposit about a foot thick. For the most part, this cultural zone rested on a zone of scattered small- to medium-sized gravels (see Figure 3). The association of artifacts with gravels in the eroded parts of the site suggested that there were no more artifacts below the surface. This was substantiated in our secondary excavation area, Square South 500/East 100, where artifacts occurred within only the top 6 inches of the eroded topsoil.

The fact that no charcoal was found in the excavations is, perhaps, the best evidence we have for believing that the site was exposed for a long time before it was covered and that the deposition was a slow process. The same explanation would apply to the absence of bone.

The presence of land snails in the deposit and under it seems especially noteworthy. The snails of the family Bulimulidae are the same forms that abound on the land today and suggest a climate not much different from that of the present (see Figure 16B). Whether this forces a conclusion for a post-Pleistocene dating, I do not know. I suspect it does however, since I excavated a mammoth in the vicinity of San Isidro during the fall of 1962. No land snails were in the deposit upon which the mammoth rested or in that which covered the bones. I do not know whether this represents a local condition or not, but I am tentatively viewing the presence of these snails as indicating a post-mammoth, and presumably a post Pleistocene date. In this connection, the absence of organic material at the site, and the lack of pollen in our soil samples makes any statement on dating especially tenuous.

The fact that the artifacts and burned rock occurred in a zone about a foot thick supports the interpretation that the site was occupied more than once. The length of the time span involved is unknown, because the digging produced no projectile points or other artifacts of diagnostic temporal value. In truth, the excavations, for all their labor, turned up too few artifacts to justify the time spent on them. Were it not for the abundant material gathered so carefully by the surface survey party, there would be little to describe in this report.

The surface survey work increased our projectile point sample considerably. Whereas, in 1960 the Early Man collection consisted of only four Plainview and one Lerma, the surface survey picked up ten more complete or fragmentary Plainview points and three classified as Lerma. The Early Man points were all found south of the road; whereas, the Catans and other more recent types were found north of the road. The areas on the western and eastern limits of the site, Hearth 14 and Control Area 15, produced no points at all. Because of this distribution, the site has been divided, for analytical purposes, into three groups: Area North (north of the highway), Area South (south of the highway), and Control Areas (Hearth 14 and Control Area 15).

CHAPTER II

Artifact Description and Analysis

The descriptive and analytical procedures followed in this chapter developed from various ideas which I presented in a symposium on the description of chipped stone. The symposium was conceived by Professor Jose Luis Lorenzo, and held during the meeting of the 35th International Congress of Americanists in Mexico, 1962. The arguments set forth in that paper (Epstein 1964) were largely for a purely descriptive approach in chipped stone terminology and for the presentation of more technological information in artifact descriptions. I noted that total chipped stone assemblages were usually neglected in American archaeology because we concentrate on what we presume to be tools (i.e., artifacts with an ascribed function such as knives, scrapers, choppers, and projectile points).

Because function is usually undemonstrable, the employment of functional terminology tends to be misleading and unnecessary. The archaeologist, I suggested, should look for patterns in chipped stone and not describe just those specimens which, because they show more workmanship, indicate intentional manufacture. The emphasis upon pattern is basic to anthropological thinking. It is the patterned and not the unique that is the substance of culture and culture comparisons.

My concern with technology arises not only from an academic interest in knowing how things are made but also from the belief that more useful cultural comparisons can be made with technological data. Clearly, the more data used in the comparative process, the more valid our conclusions will be. Since the Paleo-Indian specialist has relatively little to work with, even under the best circumstances, any additional information should be most welcome. With technological data, it is also possible to make culture comparisons at different levels. My thinking here is illustrated by an analogy with Hohokam and Anasazi ceramic tradi-

tions. Even though there was some overlapping of forms and borrowed designs, the basic methods of making a pot remained distinct throughout the histories of the two traditions. The Hohokam used the paddle and anvil, the Anasazi coiled and scraped.

The same distinctions between methods of manufacture and form can be shown to occur in chipped stone. For example, the projectile points and other thin bifacial forms of Trans-Pecos and Central Texas are often the same, but the flakes from both areas are quite different. The characteristic flake of the Trans-Pecos is what I have called an oval cortex flake (Epstein 1963), made by striking a pebble without any prior preparation, and simply removing flakes until the pebble is exhausted. In contrast, the percussion flakes of Central Texas usually show prepared platforms, often faceted. Because the flake forms of both areas are different, the technology, by definition, is different. I interpret these differences in flaking to indicate lithic traditions of separate origin. The convergence in points and bifacial forms is probably the result of borrowing rather than of population movements.

In archaeology, length, width, and thickness, together with form (usually listed as an artifact category), have long been the major categories of the descriptive process. These measurements are adequate for detailing the gross dimensions of an artifact, but they tell little else. If we wish to know how much relative effort went into the manufacture of an object, or how the object was made, standard measurements are inadequate. For technological data we need new measurements, and I have tried to present a few in the present chapter. Some of these include: the number of flake scars on the piece (used in all heavy artifacts), length of bifacially flaked edge (pebble tools), measurement of striking platform retained on the flake (unifacials), and weight.

The number of flakes removed from a piece was estimated by counting the flake scars on the specimen. The count represents the minimum number of flakes that were struck in order to make the piece. I have used this measure in all of the heavy artifacts because it provides an index to the amount of flaking and, hence, indicates the effort that went into the production of an artifact.

Weight of all artifacts is supplied because weight is viewed as important in tools of any kind. Although I cannot relate weight to function, I have tried to demonstrate how artifact weight is directly related to the amount of flaking used in producing the finished artifact.

Length and width have been used, but not consistently. In bifaces, and possibly also in unifaces, maximum length and width would seem to be governed by the flint knapper and/or his culture. They relate in some way to tolerances in hafting, or what is considered to be the most desirable dimensions of these artifact classes. In pebble tools, however, maximum length and width seem to relate more to the size of the pebble chosen for the artifact than to the finished product. Because the pebble tools of San Isidro were often made from pebbles of irregular shape, the measurements of maximum length and width have no constant relationship to the flaked edge of the piece.

I have tried, therefore, to derive information on the flaking-hafting process in pebble tools by using two measurements other than maximum length and width. Instead of maximum length I have measured the distance from the cortex end of the pebble to the cutting edge. If it is assumed that the piece is hand-held, with the cortex end in the palm, the measure reveals the preferred palm-to-cutting-edge dimension for these artifacts. Analysis indicates that this distance was fairly constant. For the width measurement usually taken on pebble tools, I have substituted the length of the edge formed by the flaking process. In the case of bifacially-worked pebble tools, this is the edge formed only by bifacial flaking. Presumably, the worked edge was primarily what was wanted, and our analysis indicates that this measure was also quite constant.

These new measures are incorporated in the description of the nonprojectile point assemblage from San Isidro. The projectile points are handled essentially in conventional terms. The technological emphasis on the cruder artifacts reflects the present state of my own interests and knowledge.

The technological aspects of artifact manufacture are given in the comments, and here additional data and charts are often included. The aim has been to relate, as much as possible, one aspect of the flaking process with another. Attention is also directed to recurring measurements or relationships. It is assumed that measurements which show little variation reflect culture norms or culturally conditioned motor habits that are involved in the selection and flaking of stone.

The names given to the various artifact groupings are descriptive except for the projectile points and gouges which have been given type names. The names thus applied refer to form alone and do not neces-

sarily imply direct cultural connections to similarly named forms found elsewhere. Where problems in understanding or defining specific types occur, a more detailed discussion is supplied in the comments and in the final chapter. Almost all of the artifiact groupings are illustrated by line drawings.

Provenience data are supplied last in the description section and in Table 1. The provenience of each projectile point and "type" artifact is supplied according to square and position within a hearth. The coarser artifacts are listed according to Area North, Area South, and Control Area.

In the following descriptions, the most extensively worked artifacts, the thinned bifaces, are presented first. They are followed by percussion bifaces, pebble tools, unifaces, cores, flakes, and flint chunks. A discussion of ground stone, quartz, and pigment ends the chapter.

THE THINNED BIFACES

Projectile points, knives, and Clear Fork Gouges are here listed under the category of thinned bifaces. As a group, all are artifacts which have been reduced to a relatively thin cross-section by controlled thinning techniques (see discussion of thinning flakes and their distribution). Most of the specimens also show the use of pressure-flaking as a final step in the flaking process. Thinned bifaces are unquestionably the products of planned and deliberate action, which is usually skillfully executed. Probably because of the fact that they represent such effort, they tend to follow rather rigid forms and sizes, and are, therefore, more easily typed than are cruder artifacts.

Under the category of thinned bifaces, the following are described: Almagre, Catan, Desmuke, Gary, Lerma, Matamoros, Pandora, Nogales, Plainview, Tortugas, Miscellaneous A through I, Large Square Base Bifacials, and Clear Fork Gouges.

Almagre (Figure 6 A)

The San Isidro Site produced one thin, pointed bifacial that is classified as an Almagre. Almagre points are essentially crudely made large contracting stem points with weakly developed shoulders. The specimen from the San Isidro Site shows slight pressure-flaking along the edges on only one surface. It is of tan patinated limestone. The tip is missing.

Maximum Length (est.)	6.5 cm.
Maximum Width	3.7 cm.
Maximum Thickness	0.6 cm.
Weight (of fragment)	11.0 gm.

Distribution: the 8–12 foot circle of Hearth #7.

Comments and Comparisons: The San Isidro Site Almagre specimen falls within the size range given for the type both in Texas (Suhm, Krieger, and Jelks 1954: 396) and in Tamaulipas (MacNeish 1958: 65). The type is generally distinguished from Gary by being larger, cruder, and having a less developed shoulder. Almagre points in Tamaulipas occur during La Perra and Almagre phases. In Texas, Almagre points have been found associated with Langtry type points in the lower levels of Centipede Cave (Epstein 1963: 34–36, Figure 8) and have been reported from the transitional levels between middle and late Archaic at the Devil's Mouth Site (Johnson 1964: 32, Figure 11, A-B). However, the Devil's Mouth Site examples have well developed shoulders and, thus, depart from the features of typical Almagre points.

There is a remote possibility that the specimen classified above as Almagre may be a broken Cody knife (Dick and Mountain 1960: Figure 7, MC-1–MC-9. If the piece is viewed so that the left edge of the contracting stem is parallel with the right side of the point, the parallels to the Cody knife are close. However, the Almagre classification seems more in keeping with the present data, because Almagre points occur in Texas and Tamaulipas, while Cody knives are, as yet, unknown in those areas. Furthermore, I know of no northeastern Mexican examples of projectile points with fine collateral flaking, such as is associated with Cody knives in Colorado (Dick and Mountain 1960).

Catan (Figures 4 A-F)

The San Isidro Site produced nine examples of thin-pointed bifacials that are classified as Catan. Five of these are complete, one is "unfinished," and three are fragmentary.

Catans are small points with convex base and sides. The base is usually thinned by removal of two or three small conchoidal flakes from both surfaces, and the sides show fine pressure-flaking. Neither the edge retouching nor the basal thinning is sufficiently extensive to mask the thinning flake scars on both surfaces of the point.

TABLE 1

Distribution of artifacts at San Isidro Site

	Hearths in Area North													Excav.	H	Area South												Control		Area North		Area South		Control		
	2	3	4	5	6	7	8	9	10	11	12	13	General	N0/N0	1	N-100 E-200	N-100 E-300	N0 E-200	N0 E-300	N0 E-400	S-200 E-400	S-400 E-400	S-400 E-100	S-500 E-100	S-500 E-200	S-500 E-300	General 1960	H 14	Control 15	#	%	#	%	#	%	Total
THINNED BIFACES																																				
ALMAGRE						1																								1	0.6	0		0		1
CATAN		2			1		1			1		1	1						1				1							7	4.0	2	0.6	0		9
DESMUKE																		2												0		2	0.6	0		2
GARY													1																	1	0.6	0		0		1
LERMA																							1							0		4	1.2	0		4
MATAMOROS												1											1							1	0.6	2	0.6	0		3
NOGALES							2																							2	1.1	0		0		2
PANDORA		1																	1	1			2	2			4			1	0.6	10	3.0	0		11
PLAINVIEW																1					2		4	3			4			0		14	4.2	0		14
MISC A-I									1			1				1							1		2	2	5			2	1.1	11	3.3	0		13
SQUARE BASE								1																1			3			1	0.6	4	1.2	0		5
CLEAR FORK BIFACE																								3		1				0		4	1.2	0		4
CLEAR FORK UNIFACE		1												1													2			1	0.6	3	3.0	0		4
TORTUGAS																1								1						0		2	0.6	0		2
																													Total	17	9.7	58	17.5	0		75
PERCUSSION BIFACES																																				
A. Pebble Biface Transition		1			3									1			1		4				3	1	1		21	1	2	4	2.2	32	10.0	3	3.9	39
B Continuous Edge Bifaces (Group A)																																				
1. Pointed		1					2	2													1	1			1		9		2	5	2.9	12	3.6	2	2.6	19
2. Rectangular		1	1	1		1	3	4	1		2	1		1	1								5	1	1		13	3	4	15	8.6	22	6.7	7	9.2	44
3. Round		2		1			2					1		1	1				1						1		6	1		6	3.4	10	3.0	1	1.3	17
4. Fragmentary		1					1	1								1	1						2		2		2	1	1	3	1.7	8	2.4	2	2.6	13
C. Continuous Edge Bifaces (Group B)																																				
1. Pointed					1	1	2	1																1		1	5		3	5	2.9	7	2.1	3	3.9	15
2. Rectangular	1	1		2	1		2	1							2				2				3				8		3	8	4.6	15	4.5	3	3.9	26
3. Round		2		1			2					1		1	1				1						1		8	1		6	3.4	12	3.6	1	1.3	19
4. Fragmentary		1		2			3	1	1	1	1				2			1	3				4	4		1	4	4		10	5.7	19	5.8	4	5.3	33
D. Miscellaneous																																				
1. Discontinuous Edge		1	1					1	1								1									1	0	2	4	4	2.2	2	0.6	6	7.9	12
2 Core Like Pebble			1														2								1	1	0		3	1	0.6	4	1.2	3	3.9	8
3. Core Like Angular		1		1	1			1									3										4		2	4	2.2	7	2.1	2	2.6	13
																												13	24	Total	71	40.5	150	45.5	37	48.6	259
PEBBLE TOOLS																																				
A. Unifacial		2	1	1	1	3	1	3						1	1								2		1		4	2	2	12	6.8	9	2.7	4	5.3	25
B. Bifacial—Sinuous	2	3	5	1	2	2	4	14				1		3	1	1	2	1	1				3	1	2	4	50	8	9	34	19.4	69	20.9	17	22.4	120
Bifacial—Straight						2								1				1						1		1	2	1	1	2	1.1	6	1.8	2	2.6	10
C. Core Like			1			1								1	1			1	1				1				4	1	6	2	1.1	9	2.7	7	9.2	18
D. Split Pebbles			1												1													1	1	1	0.6	1	0.3	2	2.6	4
E. Miscellaneous						1																			1			1	1	1	0.6	1	0.3	2	2.6	4
																												14	24	Total	52	29.5	95	28.8	34	44.7	181
UNIFACIALS																																				
A. Limestone	1	1	1	1	1	1	4	2	2	4	1	1		1	1	1	1						9	2	1	1			5	20	11.4	17	5.2	5	6.6	42
B. Flint	3	1	2				2		2	4		1			1								3	2			2			15	8.6	8	2.4	0		23
Total	7	23	14	11	11	13	31	32	8	10	5	8	2	12	13	6	11	7	15	3	1	2	48	20	16	10	164	27	49	Total	175	100.0	328	100.0	76	100.0	579

Seven of the nine specimens from the San Isidro Site are made of black flint, one is of a mottled gray and red stone, and the other is made of tan patinated limestone. Almost all of the Catan points I have seen from Nuevo Leon are of black flint; so, in this respect, most of the San Isidro examples follow the local pattern. The single specimen of tan patinated limestone is the only example, of which I am aware, of this type made of such material. This specimen is somewhat wider than the others (Figure 4 E), and may possibly be viewed as a small Abasolo rather than a Catan. The distinction between the two point types is arbitrary; Catan ranges from 15–37 mm. in length; Abasolo ranges in length from 38–76 mm. (MacNeish 1958).

The unfinished specimen (Figure 4 F), has a thick hump along the midline, presumably the result of a resistant area of flint. Because it shows no pressure-flaking, the usual marks of final workmanship on this type, the specimen is listed as unfinished.

The dimensions of the Catans from the San Isidro Site are listed below. The unfinished piece was not used in computing these figures.

	Range	*Average*
Maximum Length	2.7–4.0 cm.	3.5 cm.
Maximum Width	2.0–3.0 cm.	2.3 cm.
Maximum Thickness	0.4–0.6 cm.	0.5 cm.
Weight	4.0–7.0 gm.	5.0 gm.

Distribution: Seven of the nine Catans from the San Isidro Site came from Area North. Of these, two are from Hearth 3 (12–16′); one from Hearth 6 (24–28′); one from Hearth 8 (4–8′); one from Hearth 11 (16–20′); and one tan patinated specimen from Hearth 13 (28–32′). Another Catan was found about 300 feet north of our measuring point No. 24, in Area North, and apparently is not associated with a hearth area.

The two Catans from Area South both came from squares which produced Plainview points. One came from North 0/East 300; the other was from South 400/East 100.

Comments and Comparisons: The Catan points from the San Isidro Site have essentially the same length and width as specimens of this type recorded from Tamaulipas and Texas, but differ in thickness. MacNeish (1958: 68–69) notes that the type ranges in thickness from 3 to 13 mm., averaging about 7 mm. Both the range and the average exceed those recorded for our own specimens.

It is possible that thickness and beveling are functionally related to each other. Catan points from the San Isidro Site are not beveled, but beveling is a characteristic feature of this type in southwest Texas (Suhm, Krieger and Jelks 1954: 410, Pl. 84). MacNeish (1958: 69), notes that beveling occurs in about 25% of the Catans from Tamaulipas. Beveling is very rare on points classified as Catan from Nuevo Leon and seems to be uncommon also on the Catans of the Trans-Pecos (Epstein 1963: 41). In terms of present data, it would, therefore, seem that beveling is characteristic of southeast Texas Catans (also of Abasolo, Desmuke, Matamoros, and Tortugas) but, as one moves outward and particularly westward, the frequency of beveling is markedly reduced. The fact that beveling is more common in Tamaulipas than in Nuevo Leon is especially noteworthy.

The present data on the temporal placement of the Catan type is confined almost completely to Tamaulipas. MacNeish's excavations indicate that the type is very late and is associated with pottery. However, in the Sierra Madre, MacNeish notes that the type is numerous in the latest pre-ceramic Guerra Phase (MacNeish 1958: 69).

Desmuke (Figure 4 G-H)

The San Isidro Site produced two thin pointed bifacials of the Desmuke type. Desmuke points are small, shoulderless, roughly lozenge-shaped points with straight to slightly convex sides. The base tends to contract towards a point. Both specimens have a diamond-shaped cross section, an effect which was produced without beveling the lateral edges. Both points show extensive pressure-flaking. In one specimen the base has been carefully thinned by removal of flakes on both surfaces (Figure 4 G), but the other shows no indications of basal thinning. The dimensions are given below. Both specimens are of flint.

	Figure 4H	Figure 4G
Maximum Length	2.9 cm.	3.7 cm.
Maximum Width	1.8 cm.	1.9 cm.
Maximum Thickness	0.6 cm.	0.8 cm.
Weight	3 gm.	5 gm.
Material	Light Gray Flint	Dark Gray Flint

Distribution: Both Desmuke points came from the northwest quadrant of square NO/E200.

Comments and Comparisons: The two Desmuke points from the San

Isidro Site are so much like those described by Suhm, Krieger, and Jelks (1954: 416, pl. 87) in all measurable characteristics that they could well have come from Texas. In discussing the relationship of the Catan point to others in Tamaulipas, MacNeish (1958: 69) says, "Some of the smaller varieties of Desmuke points from southwest Texas are identical to Catan points, and I can at present show no temporal or spacial justification for setting up a separate Desmuke point type for Tamaulipas." Although there may not be either temporal or spatial justification for distinguishing between Catans and Desmukes in Tamaulipas, there seem to be enough differences in the forms of the two types to warrant a separation in the material from the San Isidro Site. The Desmukes from the San Isidro Site are so strikingly like those illustrated from southwest Texas, and so different from the Catans of the San Isidro Site, that the distinction made here between the two types seems warranted.

The temporal placement of the Desmuke type in Texas is not well established.

The fact that both Desmuke points came from the same quadrant of the same 100-foot square indicates that they may well have been dropped by the same person. It follows, therefore, that the surface of this site has not been heavily disturbed by erosional activity.

Gary (Figure 6 B)

One thin bifacial made of a coarse quality white flint is classified as a Gary. Gary points are large, relatively broad, well-made contracting stem points having shoulders that vary from weak to barbed. The San Isidro specimen is pressure-flaked along the edges of both surfaces. It has the following dimensions:

Maximum Length	4.4 cm.
Maximum Width	3.2 cm.
Maximum Thickness	0.6 cm.
Weight	8.0 gm.

Distribution: The Gary point was collected in 1960. Although its precise location was not recorded at that time, it came from the area north of the highway, approximately 200 yards west of the point where the north-south transect crosses the highway. It was found by Sr. Eduardo Barragan of Monterrey.

Comments and Comparisons: The Gary point from the San Isidro Site falls within the range of dimensions given for the type by both MacNeish (1958: 65) and Suhm, Krieger and Jelks (1954: 430, Pl. 94). In Texas, the Gary type is found primarily in the eastern part of the state, where it seems to begin during middle Archaic times. The type appears in Tamaulipas during the Almagre Phase. In Puebla, Gary points occur earlier than in either Texas or Tamaulipas, for they seem to appear first during the El Riego Phase (MacNeish 1962: Figure 9), which is dated between 7000 B.C. and 5000 B.C.

The only two contracting stem points from the San Isidro Site, (i.e., the Gary and Almagre) both come from Area North.

Lerma (Figure 4 P-S)

Four thin bifacials are classified as Lerma. Lerma points are large double-pointed bifaces. The outline varies from slender (Figure 4 Q) to relatively broad (Figure 4 P). They were formed by careful percussion flaking and show very little, if any, pressure retouching. All are relatively thick. Two are of tan patinated limestone; one is of gray, lightly patinated limestone, and one is of gray flint (Figure 4 Q). The dimensions of the four specimens from the San Isidro Site are as follows:

	Range	Average
Maximum Length	4.7– 6.5 cm.	5.4 cm.
Maximum Width	1.7– 3.0 cm.	2.5 cm.
Maximum Thickness	0.8– 1.3 cm.	1.1 cm.
Weight	7.0–28.0 gm.	20.0 gm.

Distribution: All of the Lerma points from the San Isidro Site came from Area South. One came from NO/E400, one from S400/E100, and two were picked up during the 1960 survey and have no precise provenience data.

Comments and Comparisons: The projectile points from Tamaulipas classified by MacNeish as Lerma (1958: 62, Figure 23, No. 22–27) tend to be heavier, cruder, and thicker than the Lerma points from Texas (Suhm, Krieger, and Jelks 1954: 440, Pl. 99) and the closely related Cascade point from the Pacific Northwest (Butler 1961; 1962). Two of the San Isidro specimens resemble the Tamaulipas Lerma, while the other two conform to the type as it is described for Texas. The specimen

shown in Figure 4 P is almost identical to MacNeish's Figure 23, No. 26, and our Figure 4 S is very similar to MacNeish's Figure 23, No. 24. For Texas relationships, Figure 4 Q recalls Suhm, Krieger and Jelks' Pl. 99 B and L; our Figure 4 R, which lacks a tip, seems very close to Suhm, Krieger and Jelks' Pl. 99 P.

Since detailed comparisons of the Lerma type with other double pointed forms have already appeared in print (MacNeish 1958; Butler 1961; 1962), the type is not discussed further here. However, the implications of MacNeish's and Butler's views for the San Isidro material and its relationships is discussed in the final chapters.

Matamoros (Figure 4 I-K)

The San Isidro Site produced three thin pointed bifacials that are classified as Matamoros. The type was named by MacNeish and has been described by both MacNeish (1958: 68) and Suhm, Krieger, and Jelks (1954: 448). Matamoros points are small triangular forms that have essentially straight or slightly convex sides and a base that is straight or slightly concave. The base is thinned by the removal of short flakes from both surfaces. In southwest Texas, the sides are usually beveled, but MacNeish reports that in Tamaulipas only about one-fourth of the samples are beveled.

The three Matamoros points from the San Isidro Site all fall within the dimensional ranges of the type, but differ from each other. One, made of tan banded flint (Figure 4 J), is beveled on both lateral edges, apparently by pressure-flaking. Another (Figure 4 I) is of a coarse gray flint. The last, a very long specimen (Figure 4 K), shows a slight amount of pressure retouching, but is also unbeveled. It bears a striking resemblance to the Matamoros specimen illustrated in Suhm, Krieger and Jelks (1954, Pl. 103 AA).

The basic characteristics of the Matamoros type, as indicated by the three specimens from the San Isidro Site, are as follows:

	Range	Average
Maximum Length	3.7–4.7 cm.	4.1 cm.
Maximum Width	2.0–2.5 cm.	2.2 cm.
Maximum Thickness	0.4–0.7 cm.	0.6 cm.
Weight	4.0–8.0 gm.	6.0 gm.

Distribution: Two of the three Matamoros points (Figure 4 I-J) were

collected from Area South during the 1960 survey. Their precise provenience was not recorded at that time. The third example (Figure 4 K) came from the 12–16 foot circle of Hearth #13 in Area North.

Comments and Comparisons: Since both MacNeish (1958) and Suhm, Krieger and Jelks (1954) give the Matamoros a range in length between 2 and 4 cm., the classification of the specimen shown in Figure 4 K, whose length is 4.7 cm., as a Matamoros needs explanation. As noted above, this specimen is strikingly similar to the example shown by Suhm, Krieger, and Jelks in their Plate 103 AA. According to the scale supplied in the plate, that particular specimen has a length of 4.5 cm., and so the range in length of the type as described by Suhm, Krieger and Jelks should be corrected to 2–4.5 cm. This is very close to the linear dimension recorded for our Figure 4 K.

It may be significant that the Matamoros points found by MacNeish in Tamaulipas have a greater range in thickness (6–12 mm.) than our San Isidro examples. The same parallels have already been noted for the Catans from both areas.

MacNeish reports the Matamoros as essentially a late type, which, in the Sierra de Tamaulipas, begins with the earliest pottery and reaches its greatest concentration in the Los Angeles Phase. In the Sierra Madre, however, the type is associated with pre-pottery horizon (MacNeish 1958: 68). In Texas, the dating of the type does not seem well established, but it may have appeared first about 500 A.D. and possibly survived as late as the 18th century (Suhm, Krieger and Jelks 1954: 448).

Nogales (Figure 4 L, M)

This grouping consists of two relatively thick bifacials of stone with a red patina. Although differing from each other in shape, they share enough features to be described together here. The first specimen (Figure 4 L) has a straight base and convex lateral edges. The somewhat asymmetric outline of its right side is the result of a resistant region in the stone, which apparently could not be thinned. Otherwise, the piece, which has been formed by percussion-flaking and finished off with pressure-flaking on only one surface, shows excellent workmanship. The base has been thinned by the removal of one large and several short flutes from the surface that has the pressure-flake scars.

The other specimen (Figure 4 M) differs from the first in having no

pressure flaking and no basal thinning, but a more rounded base. It may be an unfinished piece. Like the first specimen, it is thick and made of red-patinated limestone. The dimensions of both specimens are as follows:

	Figure 4 M	Figure 4 L
Maximum Length	4.1 cm.	5.0 cm.
Maximum Width	3.0 cm.	3.1 cm.
Maximum Thickness	1 .3 cm.	1.4 cm.
Weight	13.0 gm.	21.0 gm.

Although both specimens are classified as Nogales, they are more than twice as thick as the average specimens of this type (MacNeish 1958: 64, Figure 23, No. 58).

Distribution: Both specimens came from the 12–16-foot circle of Hearth No. 8. Unfortunately, our notes do not indicate whether they were close to each other or on opposite sides of the hearth.

Comments and Comparisons: The fact that both specimens came from the same circle in the same hearth, and that they are thick and are of the same material, provide the reason they are classed together here. Presumably they are contemporary. One other point, a Catan, came from the same hearth, but it was from the 4–8-foot circle and, thus, was closer to the center.

Pandora (Figure 6 H–J)

Three complete and eight fragmentary specimens of thin bifaces are classified as Pandora. As this writer understands the Pandora type, it consists of a variable group of large, well made, thin, pointed bifaces whose distinguishing feature is a straight base. The sides of the present specimens vary from straight to convex and meet the base at an angle slightly greater than 90 degrees (3 specimens) or at about a 90-degree angle (2 specimens). The points are markedly bi-convex in cross section. Basal thinning seems to have been done primarily by flaking the lateral edges rather than by fluting or flaking of the base. All of the specimens from the San Isidro Site show some pressure-flaking, which varies considerably from one specimen to another. About half of the specimens have pressure-flaking on only one surface. Two specimens retain the partial remains of prepared striking platforms, which indicate

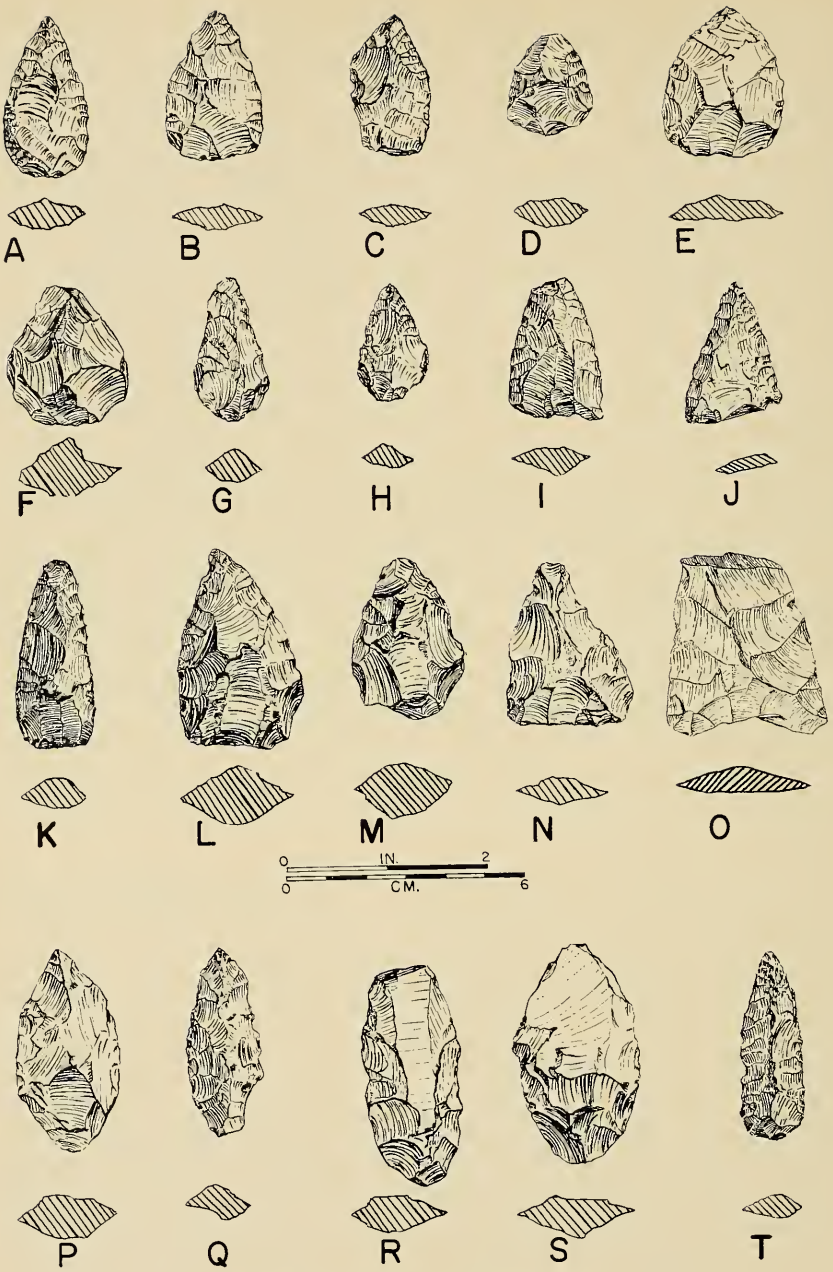

Fig. 4. Projectile points, various types.

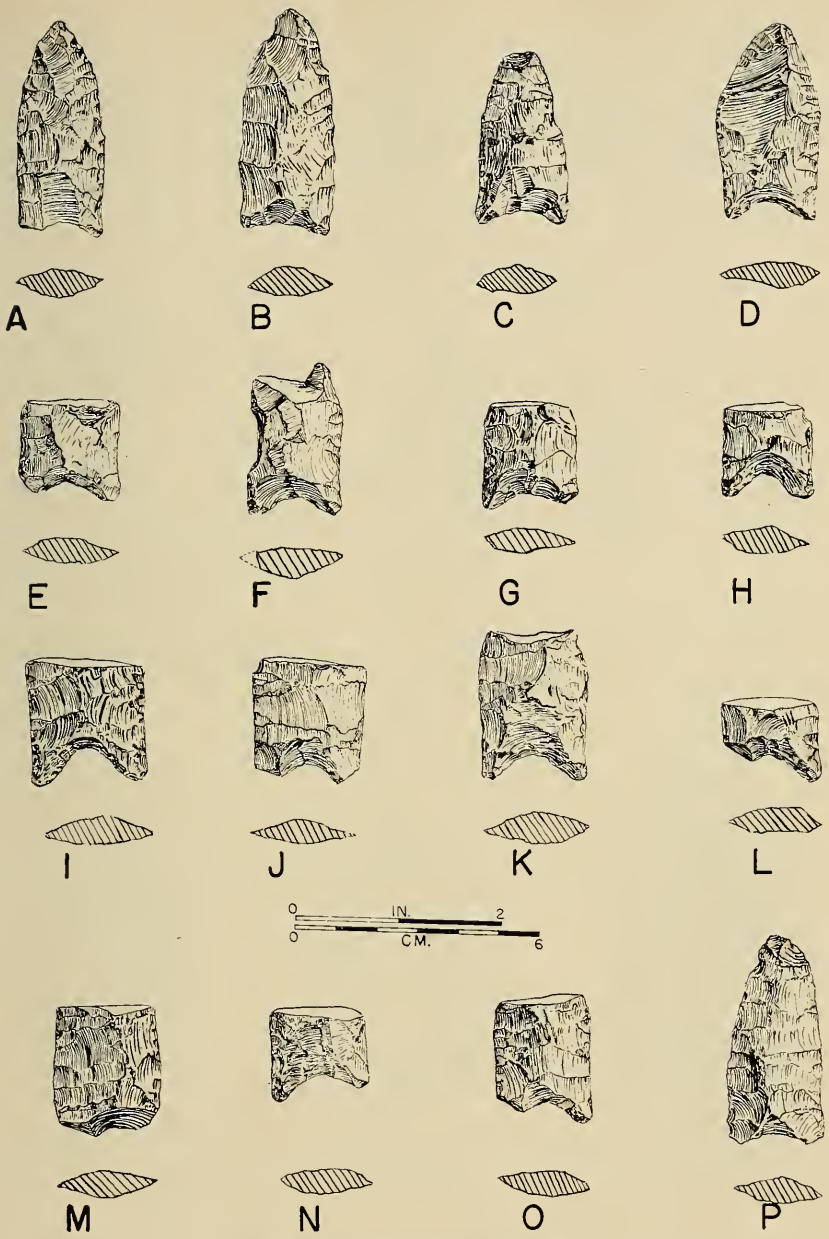

Fig. 5. Projectile points, Plainview.

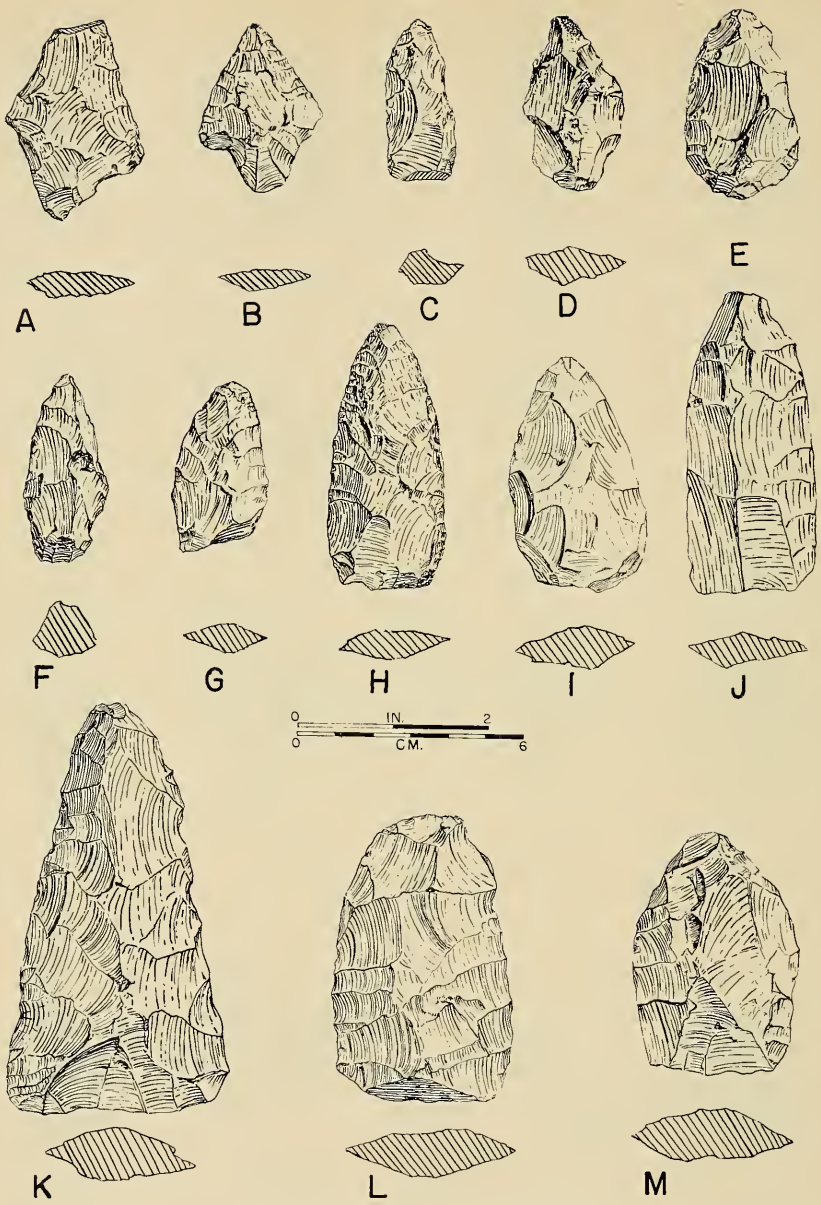

Fig. 6. Projectile points, various types.

that these examples, at least, were made from large flakes. All are of patinated limestone.

The basic dimensions of the Pandora points from the San Isidro Site are given below. Except for thickness, which was recorded for all pieces, the dimensions are based on the three complete examples. Two of the fragmentary specimens suggest that the complete points were, perhaps, 3 to 4 cms. longer than the range given below.

	Range	Average
Maximum Length	6.2– 7.7 cm.	7.0 cm.
Maximum Width	3.0– 3.4 cm.	3.2 cm.
Maximum Thickness	1.0– 1.3 cm.	1.1 cm.
Weight	23.0–30.0 gm.	27.0 gm.

Distribution: Ten of the eleven Pandora points came from Area South. Of these, four were collected in 1960 with no precise provenience data; two came fromS 400/E 100; two from S 500/E 100; and one each from NO/E 200 and NO/E 300. The single speciment from Area North, which which was originally found in two fragments, both heavily patinated, came from the 28 to 32 foot circle of Hearth No. 3.

Comments and Comparison: The Pandora type seems to be a catch-all category for large, essentially leaf-shaped, bifacials that do not presently fit other well-established categories. It is certainly a moot point whether or not we should call them knives or points, and the original type description notes that they may be called one or the other, depending upon one's bias (Suhm, Krieger and Jelks 1954: 466). The absence of the type in a site report may reflect the fact that the classifier believes he is dealing with knives, rather than points, and hesitates to use so-called projectile point terminology.

Suhm, Krieger and Jelks (1954: 466) note that the Pandora type is particularly common in Victoria and Refugio counties, where the Central Texas and Coastal Texas culture areas meet. MacNeish does not recognize the type at all in Tamaulipas. However, his "Finely Chipped Triangular Knives," which occur in Los Angeles, Laguna, Eslabones, and La Salta culture horizons or sites, seem to come very close to the Pandora type (MacNeish 1958: 88, Figure 30, No. 3).

Plainview (Figure 5 A–P)

The San Isidro Site produced fourteen Plainview points: three complete specimens, nine base fragments, and two segments.

The Plainviews from the San Isidro Site are lanceolate, pointed, thinned bifaces that have a deep basal concavity. The outlines very somewhat in the three complete examples. One (Figure 5 A) has parallel sides to about mid-length; another (Figure 5 B) expands slightly from base to mid-length. The last (Figure 5 B) is slightly asymmetrical but has slightly convex sides. Among the fragmentary specimens, eight have parallel sides and one has expanding sides. Only three specimens show any semblance of lateral grinding; whether or not this was intentional cannot be determined.

The twelve specimens (segments not included) are made of a variety of materials. Six are of tan patinated limestone, the same material that was used for the heavy bifaces and pebble tools. Two are of gray flint, two are tan flint, one is white flint, and one is a mottled white flint. The three last materials all seem to be foreign to the San Isidro area. White flint is so common in the highlands of eastern Coahuila that this area seems to be a likely source. Tan flint is more common in the Falcon area along the Rio Grande. The source of the mottled white flint is uncertain; I have seen similar material in Central Texas, where it also seems to be out of place.

The basic characteristics of the Plainview specimens from San Isidro are given below.

	Range	Average
Maximum Length*	4.6– 5.4 cm.	5.1 cm.
Maximum Width	2.2– 2.8 cm.	2.4 cm.
Width at Base	2.1– 2.8 cm.	2.3 cm.
Thickness	0.6– 0.7 cm.	0.63 cm.
Depth of base concavity	0.2– 1.0 cm.	0.68 cm.
Weight*	80.0–95.0 gm.	88.0 gm.

* Based on 3 complete specimens.

Distribution: All of the specimens classed as Plainview came from Area South. Of these, four were picked up in 1960, and the remainder were obtained during the 1962 field season. Of the thin bifaces that can be considered as projectile points, the Plainview points from the San Isidro Site represents 25% of the sample (14 out of 56).

The distribution of the specimens is given in Table 1. It seems particularly significent that 7 of the 14 specimens are concentrated in the two adjoining 100-foot squares, S 400/E 100 and S 500/E 100.

Comments and Comparisons: Points very similar to the Plainview type from the San Isidro Site apparently have a wide distribution in Mexico and Texas. In Nuevo Leon, the writer obtained one specimen (Figure 5 P) from a burned-rock area just west of the village of Garcia, and another specimen (Figure 5 O) from the Rio Pomona, just west and south of the town of Dr. Gonzalez. Another specimen (Figure 5 N) was found in the collection of Pablo Salce in Linares and presumably comes from that general region. Another example is reported from the Falcon area (Aveleyra and Borbolla 1953). Also in Tamaulipas, around the Mendez area, Sra. Antonietta Espejo recorded a Meserve, from the collection of Sr. Enrique Garza, that has a base strikingly like that of the San Isidro Plainview examples. It seems particularly significant at this time that the points obtained from the Rio Pomona, and the point from the Mendez area of Tamaulipas, were both found in sites containing heavy bifaces and pebble tools very similar to those found at the San Isidro Site. The single Plainview specimen reported by MacNeish from layer 7 (1958: Figure 25, 13) of the Nogales Site differs from our own examples in having a shallow basal concavity, as well as contracting, rather than parallel, lateral edges.

A thorough discussion of the distribution of Plainview points similar in form to the San Isidro specimens has recently been published by Johnson (1964: 46–52). Johnson believes that this variant, which he calls *Plainview golondrina*, differs from the so-called classic Plainview. Part of the material used to establish the sub-type consists of the four Plainview points obtained from the San Isidro Site during the 1960 survey. Because my own views differ somewhat from those of Johnson's, a more detailed discussion of the characteristics of the Golondrina variety is in order.

In the original description of the Golondrina variety and the features which distinguish it from the classic Plainview, Johnson makes the following observations, which I have listed numerically for greater simplicity.

1. "Whereas classic Plainview points are lanceolate, having approximately parallel edges, . . . and a straight or slightly concave base, *Plainview golondrina* points are characterized by an expansion of the edges in the middle of the blade, and by out-flaring basal corners or "ears" resulting in a "recurved" edge.

2. "The *Golondrina* points also have a deeper basal concavity and cruder, more random flake scars than classic *Plainview* points."
3. "An important difference between classic *Plainview* and most *Golondrina* points is the way in which their bases were thinned. In the case of classic *Plainview* points, several long, narrow flakes were removed from the base parallel to the long axis or the points. On the Golondrina points . . . a single or small number of wide crescentic shaped flakes were usually removed from the base . . ." (Johnson 1964: 49).

If we take Johnson's criteria and apply them to our San Isidro Site material, we find that the San Isidro specimens share features of both the classic and Golondrina varieties of the Plainview type. Three of the San Isidro Site Plainviews (Figure 5 A, D, K) have the characteristic classic Plainview type of thinning. Nine of the specimens show parallel sides, which is a classic Plainview feature, according to Johnson. Furthermore, the characteristic outflaring of the basal ears, which distinguishes the variety, is very poorly developed in the San Isidro examples. Given these differences, I hesitate to classify our San Isidro specimens as Golondrina. However, one important characteristic shared by the Golondrina variety and our own specimens is the deep basal concavity. This particular feature is also found on the type that MacNeish has called El Riego Concave at Tehuacan (unpublished photographs of type specimens loaned to the writer by Fred Peterson), and is the primary reason Johnson (1964: 103) sees the two forms (i.e., Golondrina and El Riego) as similar.

Tortugas (Figure 4 N–O)

Two thin bifacials from the San Isidro Site are classified as Tortugas. One specimen (Figure 4 O) lacks a tip; the other (Figure 4 N) seems to have been reshaped subsequent to its original manufacture.

Tortugas points are relatively large, pointed, thinned bifacials of triangular form. The base of one specimen is concave; that of the other, straight. In both specimens the base has been thinned by the removal of small, short flakes from both surfaces. The surfaces of both points show fine thinning-flake scars, but only one (Figure 4 N) has pressure retouching, which is confined to one surface. Both specimens are made

of tan patinated limestone. The basic dimensions of the Tortugas from the San Isidro Site are given below.

	Figure 4 O	Figure 4 N
Maximum Length	7.2 cm. (est.)	4.1 cm.
Maximum Width	4.1 cm.	3.1 cm.
Maximum Thickness	0.7 cm.	0.7 cm.
Weight	15.0 gm. (weight of fragment)	8.0 gm.

Distribution: Both Tortugas came from Area South. One was obtained in Square S 400/E 100, and the other from N 100/E 200.

Comments and Comparisons: The Tortugas from the San Isidro Site fall within the size range given by MacNeish, as well as by Suhm, Krieger, and Jelks. These authors report beveling as a frequent feature of the type, but this trait does not occur on either of our two specimens. There is some disagreement on the characteristics of the type. MacNeish describes the Tortugas as having concave bases only (MacNeish 1958: 64); whereas, Suhm, Krieger and Jelks (1954: 482) say that "Bases [are] straight to concave as a general rule; [but] slight convexity may be allowed."

For specimens having straight to slightly convex bases, MacNeish apparently uses the type name Nogales Triangular, which he thinks is probably ancestral to Tortugas (1958: 65). If MacNeish's terminology were followed, the straight-based specimen shown in Figure 4 N would have to be classified as Nogales Triangular, but I see no justification for this separation.

The dating of the Tortugas type is not clear. MacNeish reports the type as beginning in Late Nogales Times in Tamaulipas and reaching its maximum frequency during La Perra Times, but diminishing in frequency during Almagre.

Miscellaneous, A: Narrow, Square Base (Figure 6 C)

One complete pointed bifacial is of a patinated banded limestone. It is crudely formed and worked only by percussion flaking. The base shows a prepared striking platform, which has not been thinned. The workmanship on this specimen was sufficient to give the piece a dull point and a thin biconvex cross section. It is quite possible that the point

is unfinished, but even if the specimen had been given more thorough flaking, it would still not conform to any known point type. Its dimensions are as follows:

Maximum Length	4.1 cm.
Maximum Width	2.0 cm.
Maximum Thickness	0.9 cm.
Weight	8.0 gm.

Distribution: This point came from the 24–28-foot circle of Hearth #10. It was the only thinned bifacial from that hearth. The hearth itself produced a total of 8 artifacts.

Comments and Comparisons: Comparisons made with crude specimens such as this piece have, I suspect, very doubtful value unless the form appears frequently enough to deserve a type name. This particular specimen does not fit any of the type descriptions recorded by MacNeish for the projectile points of Tamaulipas, or by Suhm, Krieger and Jelks for the projectile points of Texas.

Miscellaneous, B: Crude Round Base (Figure 6 D, E)

This grouping consists of two crude pointed bifacials, one of flint (Figure 6 D) and the other of tan patinated limestone (Figure 6 E). Both specimens are relatively broad and have a bi-convex cross section. They show so little care in their manufacture that it is hard to believe that they are finished pieces. They were formed by heavy percussion-flaking and neither piece shows indications of pressure flaking. Their dimensions are as follows:

	Figure 6 D	Figure 6 E
Maximum Length	4.7 cm.	5.0 cm.
Maximum Width	2.8 cm.	3.0 cm.
Maximum Thickness	1.0 cm.	1.0 cm.
Weight	12.0 gm.	16.0 gm.

Distribution: Both points came from Area South. The flint specimen came from Square NO/E 400 SW¼; the tan patinated point came from S 500/E 200.

Comments and Comparisons: If these points are related to any known projectile point type, they are probably highly variant forms of Lerma

or Abasolo as defined by MacNeish (1958: 62, Figure 23). In their form and workmanship, they vaguely resemble one of the specimens classified in the present report as Lerma (Figure 4 S).

Miscellaneous, C: Long, Narrow, Round Base (Figure 4 T)

This single specimen, of tan patinated limestone, is a very carefully made pointed biface, both surfaces of which show fine and almost collateral pressure flaking. The base is rounded and has been thinned by the removal of a very short conchoidal flake from each surface. The sides are very slightly convex, and the widest part of the point is where the sides meet the base. One corner of the base shows the remains of a faceted striking platform, which indicates that the point has been made from a flake, the bulbar end of which was used for the base. Dimensions are as follows:

Maximum Length	4.8 cm.
Maximum Width	1.6 cm.
Maximum Thickness	0.6 cm.
Weight	5.0 gm.

Distribution: This specimen was found in Area South during the 1960 survey. Its precise provenience was not recorded.

Comments and Comparisons: Although this writer has seen no point precisely like this specimen, it seems quite probable that the point is in a tradition of lanceolate forms of which Catan, Desmuke, Abasolo, Lerma, and Cascade are a part. Our specimen is too long to be a Catan and much too narrow to be an Abasolo. It does, however, resemble an atypical specimen of the Abasolo type found in Texas (Suhm, Krieger and Jelks 1954: Pl. 79, O). However, none of the Abasolo points classified by MacNeish in Tamaulipas are like it. A point classified as a Cascade, from Ash Cave, Idaho (Butler 1962: Figure 21 A), is also reminiscent of the specimen described here.

Miscellaneous, D: Tapered Biface

One bifacial segment, of tan patinated limestone, may represent part of a very narrow projectile point or drill. It shows careful, vaguely parallel flaking on both surfaces. Since the flake scars have comparatively deep bulbs of percussion, the flaking may have been either by

strong pressure flaking or, perhaps, very carefully controlled indirect percussion. The cross-section of the piece is strongly biconvex. The dimensions are as follows:

Maximum Length	5.5 cm.
Maximum Width	2.4 cm.
Maximum Thickness	1.1 cm.

The complete piece was at least 7.5 cm. long. It came from Square N 1000/E 200 in Area South.

Miscellaneous, E: (Figure 6 F)

This specimen is a very thick, pointed biface of black flint. The outline suggests a long narrow projectile point with convex sides and base. It may be an unfinished point similar to Figure 4 T. The cross-section, which is plano-convex, is so thick at midpoint that it is difficult to imagine that the specimen was hafted. Its dimensions are as follows:

Maximum Length	5.0 cm.
Maximum Width	2.2 cm.
Maximum Thickness	1.4 cm.
Weight	14.0 gm.

The point came from the 24–28-foot circle of Hearth 13.

Miscellaneous, F: (Figure 6 G)

This fragment of tan patinated limestone is either the proximal or distal portion of a thin pointed biface, possibly of Lerma type. It shows some pressure-flaking on both surfaces. It came from Area South and was obtained during the 1960 survey.

Miscellaneous, G

This piece is a segment of what was almost surely a large-stemmed point with short, weak shoulders. The lateral edges of the fragment are parallel, and the maximum width is at the shoulders. The dimensions are as follows:

Maximum Length (estimated)	7.0 cm.–8.0 cm.
Maximum Width	2.7 cm.
Maximum Thickness	0.7 cm.

The fragment is of gray limestone, or limestone that has a light gray patina. It came from the south edge of the highway, approximately at N 1000/E 700, and was picked up in the process of examining the geology of the site by Larry Wilkinson in 1962.

Miscellaneous, H: Large Thinned Bifacial Fragments

This grouping consists of four specimens of tan patinated limestone, which probably represents the distal portions of large, thinned, pointed bifaces. Presumably, they come from bifaces that were too large to have been projectile points, but their original forms are not reconstructable. The fragments suggest that the originals ranged in length from 9 to 15 cm. and, perhaps, had widths of approximately half the length. The four pieces range in thickness from 0.6 to 1.1 cm. and have an average thickness of 0.9 cm.

All four specimens are from Area South. Two came from S 500/E 100, one came from S 500/E 200 NW¼, and the last was picked up in the general Area South region in 1960.

Miscellaneous, I: (Figure 6 K)

One thin, very large, pointed biface of tan patinated limestone has a triangular outline. Both surfaces show very carefully controlled percussion thinning, but there are no indications of pressure-flaking on the piece. The base has been thinned by removal of flakes from both surfaces. The cross-section is more plano-connex than biconvex, a fact which suggests that the piece was originally from a flake. It was found in two parts during the 1960 survey; both parts were heavily patinated throughout and came from Area South:

Dimensions are as follows:

Maximum Length	10.7 cm.
Maximum Width	5.8 cm.
Maximum Thickness	1.5 cm.
Weight	88.0 gm.

Maximum thickness is recorded here about one-third of the distance from the base. In form, this specimen may best be regarded as a giant aberrant example of the Tortugas type (MacNeish 1958: 64, Figure 23, No. 1–7).

A very similar artifact, from Shumla Cave, Val Verde County, Texas, was found hafted. Its base is set in a short section of wood (diameter 33 cm.), the seat being a narrow, carved-out slot. Remnants of unidentified material at the bottom of the slot suggest that the slot was partially filled to help secure the knife. (Schuez 1961: Figure 6 A, pp. 189).

Large Square Based Bifacials (Figure 6 L–M)

This grouping consists of two complete and three proximal fragments of well-made pointed bifaces. Although each specimen differs from the other, all have convex sides and a relatively straight base. They were formed by careful percussion thinning, but only one specimen (a fragment, not illustrated) shows retouching that can be attributed to pressure-flaking. One complete specimen (Figure 6, L) and one fragment show remains of a simple prepared striking platform at the base. In four of the five pieces, the base has been thinned by removing short flakes from one surface. Four specimens are of ten patinated limestone; the fifth is of gray limestone which has a very light patination. The two complete square base bifaces have the following measurements:

	Figure 6 M	Figure 6 L
Maximum Length	6.2 cm.	7.5 cm.
Maximum Width	4.4 cm.	4.6 cm.
Maximum Thickness	1.4 cm.	1.4 cm.
Weight	48.0 gm.	57.0 gm.

Distribution: All but one of these square based bifacials came from Area South. Three were picked up during the 1960 survey and have no precise provenience data; the fourth came from Square S 400/E 100. The single piece from Area North (Figure 6 M) was originally found in two parts, both heavily patinated. It came from the 20–24-foot circle of Hearth #9.

Comments and Comparisons: I suspect that any comparisons made with this group have very doubtful value, because the group itself is small and highly variable. MacNeish reports a category of square-based bifaces from Tamaulipas that resemble our specimens in size and are about as variable in form (MacNeish 1958: 86, Figure 29, No. 4–6). He notes that "This type occurs mainly in the Lerma levels, though it is present in significant amounts in the Los Angeles components, and is

present in all Almagre and La Perra levels" (MacNeish 1958: 86). He also notes that square-based bifaces occur in the Falcon Dam area (Aveleyra 1951). The same general form appears in Trans-Pecos of Texas (Epstein 1963: Figure 15, J, L).

There is some reason to believe that artifacts of this general form may be intermediate stages in the manufacture of projectile points. Prufer (1963) has given some evidence from Ohio in support of this view. MacNeish (1958: 86), however, reports the presence of gum at the base of a number of specimens of square-based bifaces, which suggests that some members of this grouping, at least, were completely finished and hafted.

Clear Fork Gouges (Figure 7 A–I)

The San Isidro Site produced eight artifacts that fit the description of Clear Fork Gouges (Ray 1941). Of these, four are bifacial and conform to Ray's Clear Fork Gouge 1; the others are unifacial and fit the classification of Clear Fork Goudge 2. As the term Clear Folk Gouge is understood here, it refers to relatively thick artifacts of triangular shape. The sides may vary in outline from straight to slightly convex; the base, from slightly convex to concave. The base is characterized by a steep bit or cutting edge which is formed by percussion-flaking from the ventral surface. The ventral surface, as viewed from front to back (base to apex) is relatively flat. The dorsal surface is usually highest near the bit and tapers gradually toward the apex. In cross-section, the dorsal aspect of the Clear Fork Gouge has a markedly keeled appearance.

Gouges from the San Isidro Site are made only by percussion-flaking and percussion-thinning. They show no indications of pressure-flaking. The unifacial specimens are apparently made from very thick flakes that were carefully shaped into the proper triangular form. Since all of them are of tan patinated limestone, a material which shows no percussion waves or rings, it is impossible to determine which end of the original flake served for the base or bit end of the gouge.

All of the bifacial gouges except one (Figure 7 C) are especially thick at the bit end. The single exception may have been manufactured from a broken bifacial. Three of the four bifacial gouges are made of limestone; the fourth and smallest is of flint.

Because each specimen varies somewhat from the others, the measure-

ments of each are given below. It should be noted that each group varies considerably in length, weight, and, to some extent, in thickness, but that the maximum width seems relatively constant. For the bifacial group, the total range in maximum width, which is at the bit, does not exceed 0.3 cm., while for the unifacial gouges the variation is 0.6 cm. The fact that maximum width remains relatively constant suggests that the function of these artifacts may have been highly specialized.

	BIFACIAL GOUGES			
Maximum Length	8.4 cm.	7.0 cm.–est.	6.1 cm.	4.5 cm.
Maximum Width	4.3 cm.	4.2 cm.	4.0 cm.	4.2 cm.
Maximum Height	2.2 cm.	1.7 cm.	2.0 cm.	1.4 cm.
Weight	81.0 gm.	63.0 gm.	49.0 gm.	26.0 gm.
Shape of bit	straight	straight	convex	concave
	UNIFACIAL GOUGES			
Maximum Length	5.7 cm.	5.7 cm.	5.3 cm.	7.4 cm.
Maximum Width	3.7 cm.	3.5 cm.	3.1 cm.	3.1 cm.
Maximum Height	1.6 cm.	1.5 cm.	1.7 cm.	3.0 cm.
Weight	31.0 gm.	24.0 gm.	30.0 gm.	53.0 gm.
Shape of bit	straight	straight	straight	askew*

* Not at a right angle to the length.

Distribution: Seven of the eight gouges from the San Isidro Site came from Area South. The single specimen from Area North, the most aberrant of the unifacial specimens, was from the 28–32-foot circle of Hearth #3. Of the other unifacial gouges, two were picked up during the 1960 survey from Area South, but without precise provenience data, and the third (Figure 7 G) was found in the north trench of the excavations 2.5 feet below the surface. It was discovered after two days of heavy rain, in a trench still partially filled with water. Since four excavations failed to produce any other indication of cultural material at the depth at which the gouge was found, it is assumed that the gouge was washed into the trench during the rains.

All of the four bifacial gouges came from Area South. Three came from S 400/E 100; the other, from S 500/E 200.

Comments and Comparisons: It seems desirable to distinguish the amorphous tool category which has the functional designation "gouge" from the more specific artifact forms which fall under the heading of

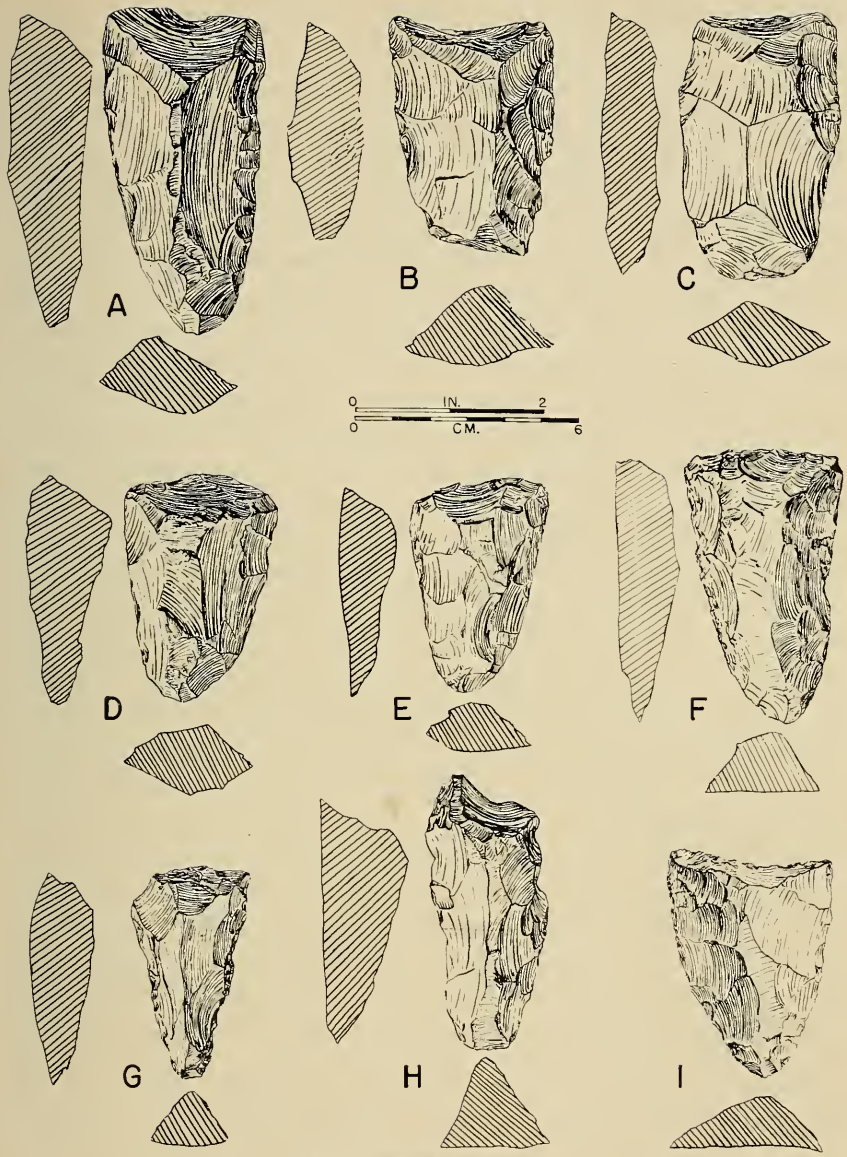

Fig. 7. Clear Fork Gouges.

Clear Fork Gouge. The archaeological literature indicates that the term gouge, like most functional identifications, means different things to different people, and so the term has little value for precise comparative

studies (Epstein 1964). For some scholars a gouge is an artifact characterized by a steeply retouched end or bit, but this same feature is also shared by many forms of snubnosed end scrapers. Others, apparently, suppose that the term is sufficiently understood so that no full description is needed. MacNeish's Keeled Teardrop End-scrapers (1958: 81, Figure 28, 12–14) for example, resemble the unifacial Clear Folk Gouges described in this text much more closely than do the artifacts he lists as gouges (1958: 79, Figure 27, No. 6–8), which, to judge from the description and photographs, apparently lack a steeply retouched end or bit.

The term Clear Fork Gouge is more precise; it has the status, or near-status, of a named projectile point type. By using the prefix Clear Fork, we avoid the problem of positive functional identification, as well as that of deciding whether we are dealing with a gouge or a scraper, in much the same way that a point type name avoids the problem of identifying the artifact as a projectile point or a knife. Of Cyrus Ray's (1941) six different types or sub-types of Clear Fork Gouges, the two dominant forms are the bifacial (Ray's type 1) and the unifacial (Ray's type 2) which we have already described for the San Isidro collection. These two forms are widely distributed in the Southern Plains and in Mexico.

The data now on hand indicate that Clear Fork Gouges or Clear Fork Gouge-like forms appear during terminal Pleistocene times in North America. Some of the "trapezoidal scrapers" of the Frontier Complex at the Allen Site, Nebraska (Holder and Wike 1949: 263, Figure 67, B–D), are apparently Clear Fork Gouges. In Texas, along the Rio Grande in the Amistad Reservoir Area, both unifacial and bifacial Clear Fork Gouges have been found associated with Plainview points of the Golondrina variety at the Devil's Mouth Site (Johnson 1964). At Damp Cave, in the same reservoir, there is some reason to believe that bifacial Clear Fork Gouges may be associated with Lerma points (Epstein 1963). Much further south, a unifacial artifact, somewhat similar to a Clear Fork Gouge, was reported with the First Iztapan Mammonth (Aveleyra and Maldonado-Koerdell 1953: 338, Figure 105, 4). A similar artifact was discovered in situ at the base of the gravels of the Upper Becerra formation at Tequixquiac (Maldonado-Koerdell and Aveleyra 1949).

MacNeish reports no Clear Fork Gouges by that name in Tamaulipas. His "gouges" appear for the first time during Nogales times and persist into the Almagre period (MacNeish 1958: 79). Since the temporal placement of the Clear Fork Gouge has a direct and important bearing on the

dating of the San Isidro Site, further discussion of the dating and distribution of Clear Fork Gouges is deferred to Chapter 5.

THE PERCUSSION BIFACES

Listed under the class, Percussion Bifaces, are a series of relatively thick artifacts that have been formed by heavy percussion flaking. Their surfaces exhibit large conchoidal flake scars with deep negative bulbs of percussion. None of these specimens show evidence of the thinning techniques which characterize the thinned bifaces just described.

Percussion bifaces are here divided into six categories. The first, called pebble-biface transitions, consists of artifacts that are flaked too much to be listed under partially modified pebbles (pebble tools), but still retain pebble characteristics. The next two groups are conventional bifaces that have a more or less continuous edge. The remaining three categories are hard to classify and may well be residual. They all have an angular, core-like appearance. I doubt that they are flake cores; as noted later in the discussion of flakes, long flakes, which I associate with flake cores, are quite rare at this site.

Distribution: With the exception of the pebble-biface transitional pieces, most of the percussion bifaces are evenly distributed throughout the site, appearing in essentially the same proportions in Areas South and North, and the Controls. The relative numbers of continuous edge bifaces in groups A and B are practically identical wherever they are found, and so the distinction between these two groups has no distributional significance. The striking variations in the distribution of the pebble-biface transition group are hard to explain. These objects constitute 10 per cent of the assemblage in Area South, but only 2.2 per cent in Area North, and 3.9 per cent in the Controls. I suspect that this difference correlates with some other aspect of the chipped stone complex. For example, since these transitional pieces are intermediate in flaking between the pebble tools and the percussion bifaces, a higher proportion of pebble tools might be expected in Area South. However, this is not the case.

It should be noted also that the Control Areas have a higher proportion of bifaces than either Area North or Area South. This percentage is largely a reflection of the absence of thinned bifaces from the Control Areas.

Comments and Comparisons: Crude percussion bifaces such as those from San Isidro have a very wide distribution. In Asia and Africa, where these artifacts constitute a large part of the Paleolithic assemblages, their taxonomy has been worked out in great detail and specific forms or classes appear to have comparative significance over wide areas (Mason 1962). In the New World, and particularly in the northern hemisphere, percussion bifaces have received varying attention, ranging from meticulous treatment (Haury 1950) to almost complete neglect. There is little agreement on terminology, and the procedures for classification are not at all consistent. As a result, it is unlikely that any detailed comparative treatment of the San Isidro bifaces has much significance. The few comments below illustrate some of the difficulties involved in searching for comparable forms.

In Tamaulipas, crude percussion bifaces are classified under the terms ovoid bifaces, choppers, gravers, square-based bifaces, semilunar blades, and small and large chipped discs (MacNeish 1958: pp. 85–86). Our classifications are not the same, but I suspect that MacNeish's chipped discs are similar to my round continuous-edge bifaces, while his square based and ovoid bifaces resemble my pointed and round continuous-edge bifaces. What are called gravers (MacNeish 1958: fig. 29, 7–11) appear to me to be a doubtful category, and if comparable specimens were indeed at San Isidro, I probably classified them as pointed continuous-edge bifaces. I have the impression that the material described for the Sierra de Tamaulipas contains a larger series of rounded or disc-shaped bifaces than was found at San Isidro.

Many sites in Central Texas, which contained a large series of percussion bifaces and pebble tools similar to those from San Isidro, were excavated during the W.P.A. period of the 1930's. Most of this important material is undescribed. The few published reports that are available (e.g. Jackson 1938) handle these artifacts so inadequately that detailed comparative treatment is impossible. Unfortunately, percussion bifaces are relatively uncommon in the sites that have been excavated more recently, and so these artifacts have been classified and described under broad headings such as heavy bifacial blades (Suhm 1955: Pl. 8,b,c,e,f), large bifacial tools (Johnson et al. 1962: 33, fig. 15 A,B), or choppers (Johnson et al. 1962: 39, fig. 15 E,F). While it is possible to find parallels between individual specimens from Texas and San Isidro, the

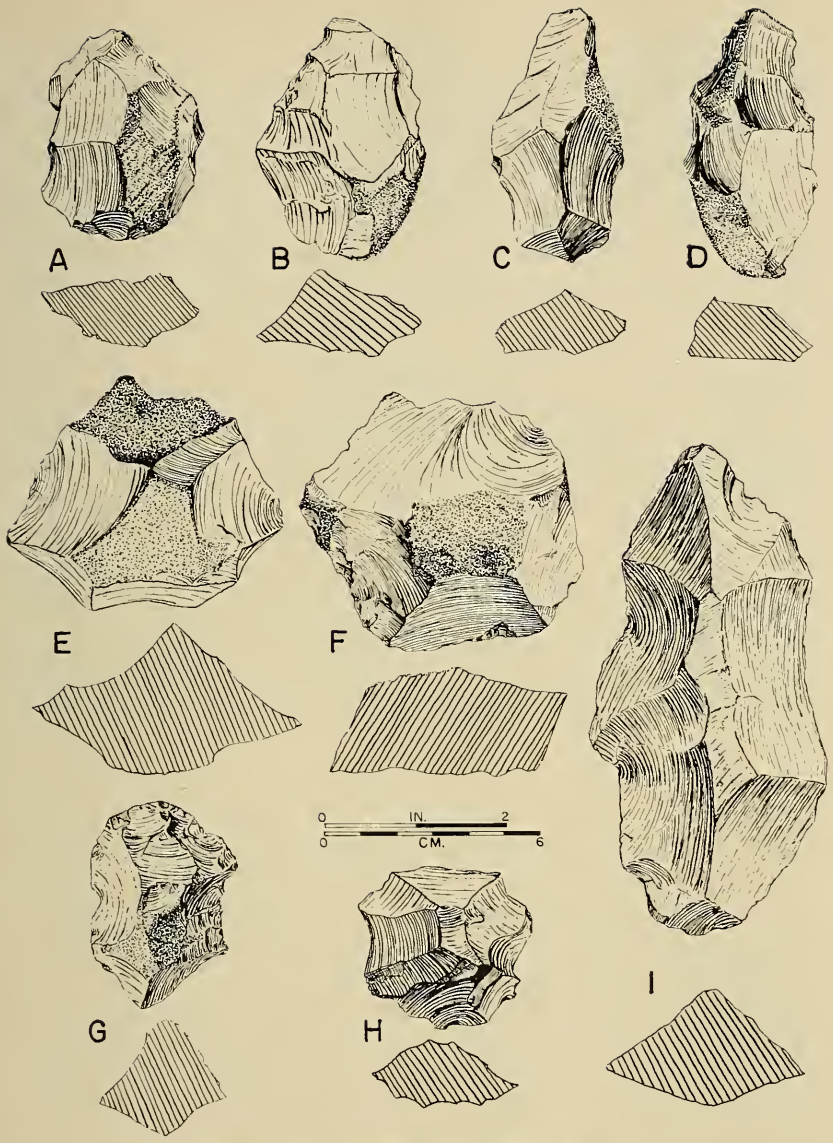

Fig. 8. Continuous Edge bifaces, groups A and B.

absence of a large series of a particular bifacial class from Central Texas gives such a comparison little value.

Ventana Cave in Arizona produced many percussion bifaces which

resemble specimens from San Isidro. Under the category of "implements flaked on two or more faces" are flake knives, blanks, ovoids, and discoidals (Haury 1950: 243–247, fig. 43). These appear to parallel the various shapes subsumed under our continuous-edge bifaces. The Ventana classification differs from ours in the use of the term "chopper." What Haury calls core choppers, trimmed partly around the edge (Haury 1950: 251, fig. 46a), recall my pebble-biface transitions, or perhaps group A of the continuous-edge bifaces. Haury's core choppers with peripheries entirely sharpened (Haury 1950: 253, fig. 47 a–b) would be classified as group B of the continuous-edge bifaces at San Isidro.

A series of bifaces, apparently smaller in size than the specimens from San Isidro, has recently been reported from Alabama. A number of the illustrations show percussion bifaces that would be classified at San Isidro as pebble biface transitions, while others parallel the continuous-edge bifaces of groups A and B (Lively and Josselyn 1965: Pls. 15–17, 19–20, 22–26). These artifacts have so far received only preliminary treatment with no statistical discussion. It would appear, however, that many of the bifaces are pointed and may have served as drills. I do not believe these last are duplicated at San Isidro, but they may bear a distant relationship to the gravers from Tamaulipas (MacNeish 1958: fig. 29, 7–11).

There has long been a tendency to refer to certain crude bifacial specimens as blanks, or, to use a more recent term, preforms (Brott 1966: 161). The category reflects the view that the artifacts so classified are too crude to have been used in their present form and were probably meant to have been worked still further. While this may be so, it is difficult to prove. The biface classification presented in this report is one in which the extent of flaking plays a dominant role, and, with such a classification, one could consider the pebble-biface transitions as blanks or preforms. I find a judgment of this kind personally unsatisfying because I see little way of proving the intent of the maker. If, however, a blank or preform specifically refers to a biface that is to be thinned, then I doubt if any of the percussion bifaces from the San Isidro Site deserve that term. The San Isidro percussion bifaces are too thick in the center and too sinuous at the edges to be thinned easily. While a skilled knapper could certainly thin these artifacts further, he would be going about it the hard way. It would have been much easier, for example, to start

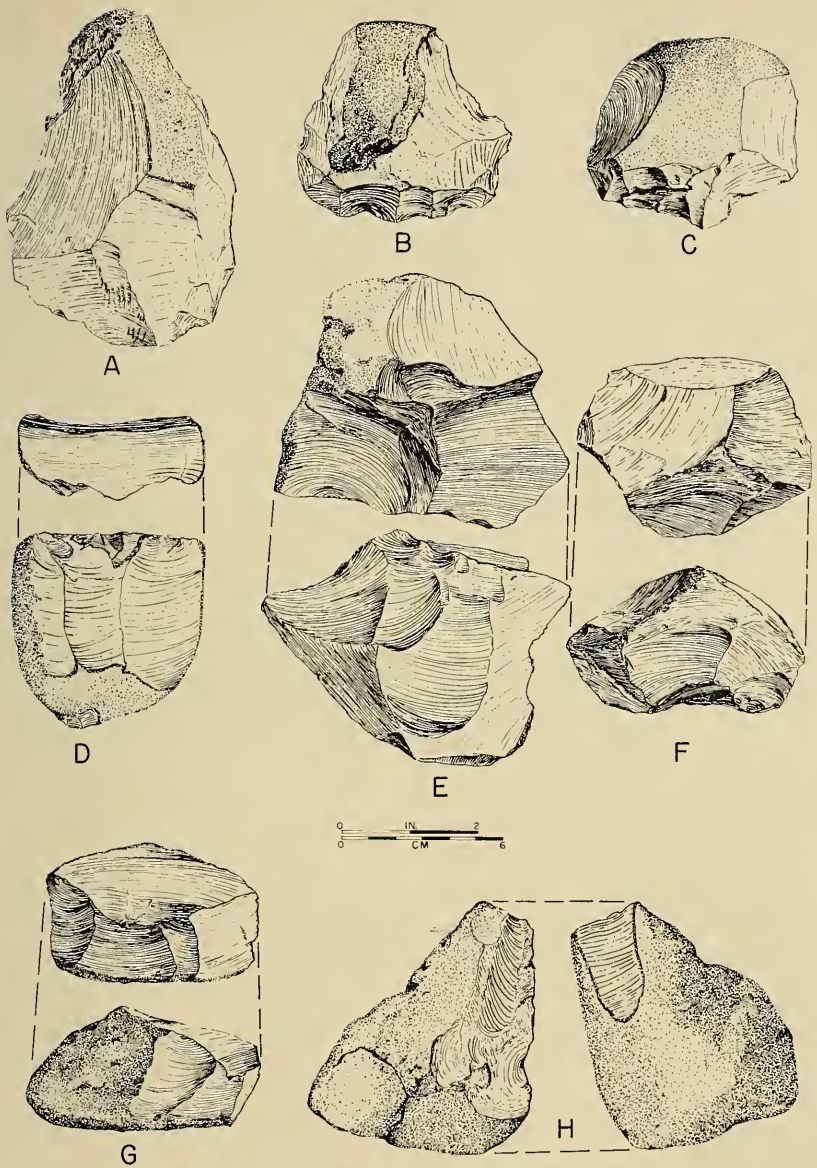

Fig. 9. Pebble-biface transitions, core-like pebbles, etc.

with a thinner pebble, and then rough out the form by striking the pebble at or close to the edge. This procedure would have produced a less sinuous edge and a more even surface than is found on the percus-

sion bifaces, and these features would have made the artifact much more suitable for future thinning.

Pebble-Biface Transitions (Figure 9 A–C)

This group consists of thirty-nine artifacts that have an extensive cutting edge, produced by bifacial flaking. The artifacts in this class are flaked too much to fit the partially modified pebble category (i.e., pebble tools), but still are not flaked enough to be considered true bifaces. Less than 50% of the pebble cortex is retained, and it is confined to one end of the piece.

	Range	Average
Number of flakes removed	4–15	8.8
Cortex to Edge	3.6– 9.4 cm.	6.2 cm.
Maximum Thickness	1.5– 5.8 cm.	3.6 cm.
Weight	14–534 gm.	174 gm.

Comments: The intermediate position of this grouping, between the less-worked pebble tools and the more extensively flaked bifaces, shows up clearly in a comparison of the measurements. The average figures obtained for maximum weight, number of flake scars, and thickness of the pebble-biface transitions fall between those recorded for the pebble tools and the bifaces.

Continuous Edge Bifaces: Groups A and B (Figure 8)

These two groupings, consisting of ninety-three specimens each, are characterized by having a single bifacially-worked edge which goes around the entire piece. Group A (Figure 8 A–E), consists of specimens that retain a slight amount of cortex at the edges, while group B (Figure 8 F–I) shows no edge cortex at all and, therefore, somewhat more extensively worked. Both groups share a variety of intergrading forms that are characterized as pointed, rectangular, or oval. Of these, the rectangular forms comprise about 50% of the sample, while the remainder are equally divided among the pointed and oval shapes.

Comments: Bifacial flaking, especially if extensive, will usually produce specimens with a bi-convex cross-section. Among both groups of continuous-edge bifaces, the bi-convex form is most frequent. In group A, 77% are classed as bi-convex, 17.6% as plano-convex, and 5.1% are too

TABLE 2

Characteristics of Continuous-Edge Bifaces

	No. Flakes Removed		Maximum Length (cm.)		Maximum Width (cm.)		Maximum Thickness (cm.)		Weight (gm.)		No. Specimens Measured
	Range	Av.	Range	Av.	Range	Av.	Range	Av.	Range	Av.	
Group A: Some Cortex											
Pointed	4–13	9.5	4.3–7.3	6.1	2.7–5.4	3.8	1.2–2.6	2.2	14–97	54	11
Rectangular	3–17	10.5	3.1–8.4	5.5	2.2–6.8	4.3	1.1–3.0	2.2	9–132	60	33
Round	8–22	14.3	DIAM.		3.8–8.2	6.3	1.6–4.1	3.2	23–246	116	12
Group B: No Cortex											
Pointed	13–28	18.1	5.4–13.3	7.6	3.1–6.4	4.5	1.7–3.8	2.4	33–244	82	12
Rectangular	12–22	15.9	4.2–9.3	6.7	3.0–6.9	4.8	1.1–3.9	2.6	13–231	98	16
Round	7–19	13.7	DIAM.		3.5–7.8	5.9	1.5–5.0	2.8	22–237	92	11

irregular to be classified. In group B, 94.6% are bi-convex, and only 5.3% are plano-convex. Presumably, the higher proportion of bi-convex specimens among the group B examples is the result of the more extensive flaking found in that group.

Other than the presence of some edge cortex in one group and none in the other, the most critical difference in groups A and B seems to be in the number of flake scars removed. Group A artifacts show considerably less average flaking than do members of group B. It might be thought that members of group B are simply more extensively flaked examples of group A, but this does not appear to be the case. The average dimensions of group B specimens tend to be greater than those of group A. Since, in lithic material, the parent cannot be smaller than the daughter, it follows that group B specimens, for the most part, derive from larger parent pieces than those of group A and are not worked down from them.

An attempt was made to determine whether the size differences noted above could be related to different kinds of parent pieces, such as flakes or cores. Efforts of this kind should be viewed with caution, for the characteristics of the parent piece are usually obscured by bifacial flaking. Occasionally, however, enough of the features of the sources are retained to permit some identification. For example, the presence of patches of cortex on both surfaces of a biface suggests that the specimen came from a pebble. If the piece exhibits portions of an unretouched striking platform, the source was clearly a flake. The results of this analysis are given below.

Table 3 indicates that, in cases where it is possible to identify the origin of a biface, slightly more group A examples came from cores than from flakes. In contrast, among the specimens of group B, twice as many were made from flakes. In both groups, however, the undetermined category is very large and so I view the results with some scepticism.

TABLE 3

Source (either Flake or Core) of Major Biface Groupings

Biface Group	Flake		Core		Undetermined		Total
	No.	%	No.	%	No.	%	
A: Some Cortex on Edge	20	31.2%	25	39.3%	19	29.7%	64
B: No Cortex on Edge	28	38.9%	14	19.4%	30	41.7%	72
C: Total	48	35.3%	39	28.7%	49	36.0%	136

Yet, granting all the possibilities of misinterpretation, it may be significant that the larger artifacts of group B seem to come mostly from flakes, rather than cores as would normally be predicted. If such is the case, the flakes illustrated in Figures 13 and 14 would be adequate for this purpose. The primary flaking industry at San Isidro produced flakes that were as massive as any of the artifacts found at the site.

Perhaps more important than the inferences made above is the fact that the data indicate that both cores and flakes served for the production of bifaces. The fact that it was even possible to estimate the parent piece for some of our two groups emphasizes the essentially coarse nature of the bifacial flaking.

The number of fragmentary and whole specimens in groups A and B seems to be related to the skill involved in their manufacture. Among the specimens of group A, 16.4% (13 out of 79) were fragmentary, while 39.2% (29 out of 74) of the group B pieces were broken. I suspect that these differences reflect the additional flaking found on group B specimens, because the more a piece is worked, the greater are the chances of breakage. It could be argued that additional breakage is a function of use, but I know of no supporting evidence for this view.

Distribution: Both groupings of continuous-edge bifaces appear in about the same frequency in all parts of the site. It would appear, therefore, that the distinction between them is unimportant.

Discontinuous-Edge Bifaces (Figure 9 F)

This is a grouping of twelve large artifacts that have three or more surfaces, and two or more bifacially flaked edges. The edges may converge or terminate in cortex, but no single edge goes completely around the piece. No particular pattern of flaking is indicated. It is difficult to view these sepcimens as having been made with a particular form in mind. They may represent unsuccessful attempts to fashion a more conventional biface.

	Range	Average
Number of flakes removed	6–18	11.0
Maximum Length	2.8– 9.0 cm.	6.8 cm.
Maximum Width	2.5– 6.7 cm.	5.5 cm.
Maximum Thickness	1.2– 6.3 cm.	3.7 cm.
Weight	10.0–350 gm.	160.0 gm.

Distribution: The highest frequency of discontinuous-edge bifaces is found in both control areas (H 14 and CA 15), where they number between 15% and 16% of the total artifacts.

Core-like Pebble Bifaces (Figure 9 D)

This category consists of eight aberrant examples of artifacts that show many of the features of the pebbles from which they were derived, but are still flaked too much to be considered pebble tools. They are called core-like, because from one to four long flakes (length-breadth index from 3.5 to 5.0), ranging from 2 to 6 cm. in length, were taken from them. In five specimens, the striking platform was produced by a single flake, but in the other three examples, three to four flakes were removed. Flake platform angles range from 60 to 85 degrees, which is greater than that found on the core-like pebble tools, discussed elsewhere. Because most of the flaking on bifaces resulted in the production of conchoidal flakes, rather than long flakes, the separation of these artifacts from the rest seems justified. However, no two specimens are alike, and, since (as discussed later) very few long flakes have been found at the San Isidro Site, the core-like status of these artifacts is very much in doubt.

	Range	Average
Number of flakes removed	3–10	6.7
Maximum Length	4.7– 8.9 cm.	6.8 cm.
Maximum Width*	2.4– 8.1 cm.	5.2 cm.
Maximum Thickness	2.2– 7.1 cm.	4.0 cm.
Weight	61–770 gm.	262 gm.

* Measured as the width of the striking platform.

Distribution: Of the total of eight core-like pebble-bifaces, one came from Area North, four from Area South, and three from the control areas.

Core-like Angular Bifaces (Figure 9 E)

This category consists of thirteen bifaces that have more than one flaked edge and more than two surfaces. In these respects, the grouping resembles the discontinuous-edge bifaces. They are separated from the latter because they give the impression of being crude, faceted flake

cores. The three polyhedral cores recovered from the cite (Figure 14 F–G) may be the finer end of a flake core continuum, of which this grouping represents the cruder examples. It is probable that these specimens would have been lumped with the discontinuous-edge bifaces if the polyhedral cores had not been discovered. These artifacts are probably the crudest and largest of all artifacts classified as bifaces.

	Range	Average
Number of flake facets	9–19	13.1
Maximum Length	5.5–11.3 cm.	8.3 cm.
Maximum Width	3.7– 9.7 cm.	5.8 cm.
Maximum Thickness	3.8– 7.8 cm.	5.2 cm.
Weight	54–612 gm.	286 gm.

Distribution: The distribution of these artifacts is essentially the same throughout the site. They constitute between 2% and 3% of the sample from each area.

PEBBLE TOOLS

As the term is used here, a pebble tool is a pebble or cobbel that has been only slightly modified by percussion flaking. More than 50% of the original cortex of the pebble is retained. The modifications involve the formation of an edge or edges by either unifacial or bifacial flaking. The pebble tools have been subdivided into the following categories: unifacially worked edges, bifacially worked edge (sinuous and straight), split pebbles, core-like pebble tools, and miscellaneous modifications.

The limited extent of flaking found on the pebble tools is illustrated by comparing the most common kind of pebble tool (the sinuous edge bifacially worked pebble tool) with the most frequent form of heavy percussion bifacial (continuous edge bifaces Groups A and B). This is done in the table below, which utilizes the averages recorded for the subdivisions of each group.

TABLE 4

Comparison of Biface and Pebble Tool Characteristics

	No. Flakes Removed	Length cms.	Width cms.	Thickness cms	Weight gms.
Sinuous Edge Pebbles	3.5–9.5	6.3–8.0	4.9–6.9	3.1–3.8	182–416
Continuous Edge Bifaces	9.5–18.1	5.5–7.6	3.8–4.8	2.2–3.2	54–116

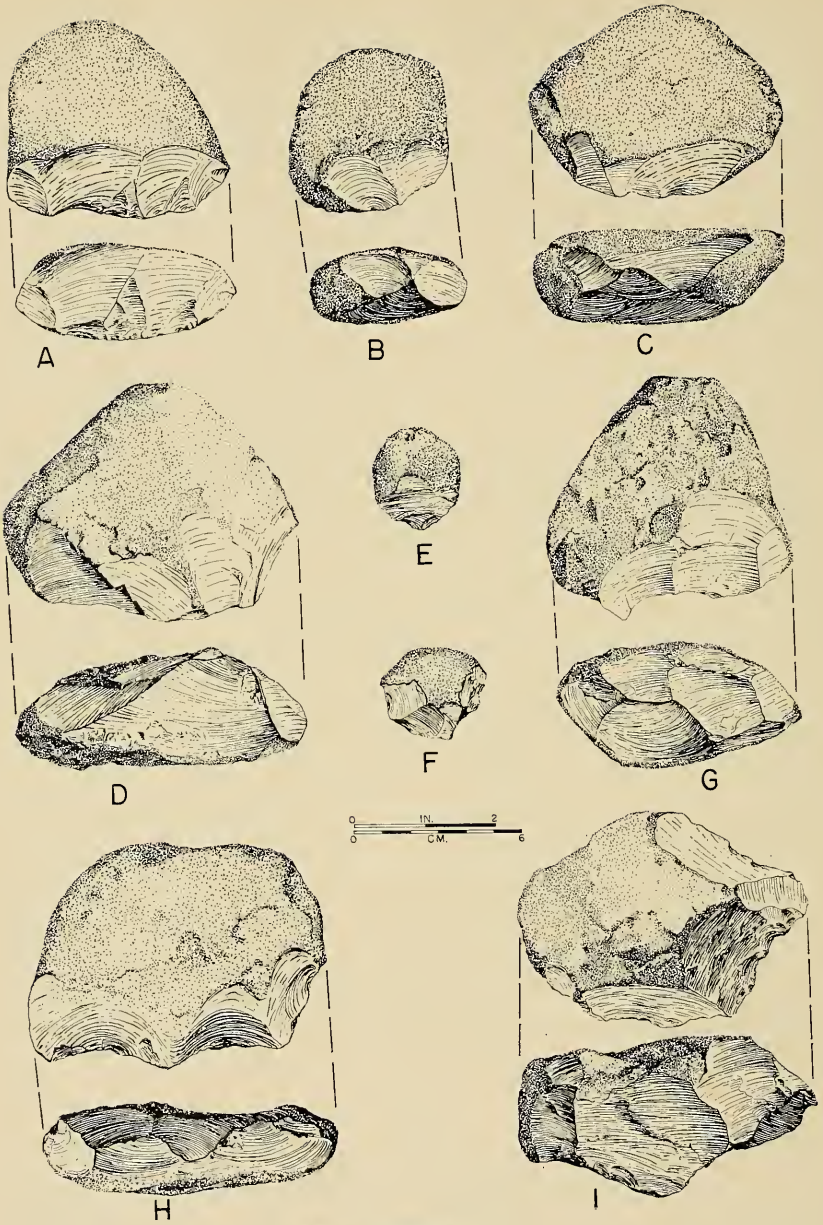

Fig. 10. Pebble tools.

The table shows that most of the measurements of the bifaces pick up where the pebble tools leave off. Bifaces have more flakes removed, are narrower, are thinner, and weigh less than pebble tools. The only measurement that shows no significant difference is length. Presumably, cultural norms at San Isidro demanded that the length of either a biface or a pebble tool should be about the same, even though other dimensions might differ.

Distribution: The proportion of most pebble tools in the assemblages from Areas North and South are strikingly similar. The significant exception is found in the unifacial pebble tools, which are 2½ times more abundant in Area North. It should be noted that the Control areas have a higher percentage of all kinds of pebble tools than either Area North or South. This probably reflects the fact that since the Control areas lacked projectile points, the remaining tool classes occur in proportionately greater numbers.

Comparison: Pebble tools similar to those described here can be found in a large number of early paleolithic assemblages of the Old World. The fact that this primitive tool class persists into almost the historic period in various parts of America attests to the fundamental utility of the group.

It would seem that artifacts similar to the San Isidro pebble tools are relatively rare in the Sierra de Tamaulipas; MacNeish does not mention any category that is analagous to them. However, the term "pebble chopper" appears among the traits given for the Infernillo and Ocampo phases in the Sierra Madre of southwestern Tamaulipas (MacNeish 1958: 167–168). These tools are not described or illustrated.

In Texas, pebble tools have received little attention. When they occur, they are usually referred to as fist axes (Jackson 1938: fig. 25) or choppers (Johnson et al. 1962: fig. 28 B,C). While pebble tools or hand axes appear over much of the state, there is little published material on the variations in form or frequencies. A large collection of pebble tools, along with other artifacts, was obtained in excavations in Central Texas during the 1930's, and there are many specimens which parallel forms from San Isidro, but this material is largely undescribed. Large, crude fist axes are said to be common in the Falcon focus of Southwest Texas (Suhm, Krieger, and Jelks 1954: 139), but the data on which this statement is based have not yet been systematically described or analyzed. Because the Falcon Dam region is relatively close to the San Isidro Site,

the absence of published material from there is particularly lamentable.

Pebble tools have been reported from a number of localities in the southwest. At Ventana Cave, pebble choppers constitute part of the artifacts classified under choppers, but these artifacts are comparatively rare. Of the 6,000 artifacts obtained from the excavations, only 28 pebble choppers are listed. In contrast, at San Isidro, pebble choppers comprise almost 30 per cent of the assemblages from Areas South and North. Although Haury's categories are different from mine, the pebble choppers from Ventana appear to be similar to the bifacial sinuous-edge pebble tools from San Isidro. At Tularosa Cave in New Mexico, both unifacial and bifacial choppers are reported from all levels (Martin et al. 1952: 175–176; figs. 58–59), and appear to be essentially like our own unifacial and bifacial pebble tools. At Tularosa, choppers are also uncommon; only 6 unifacials and 19 bifacials are listed.

The Lively Complex from Alabama includes a number of specimens that resemble pieces from San Isidro. In addition to a large series of bifacial and unifacial pebble choppers (Lively and Josselyn 1965: Pls. 3–10, 12), there are split pebbles (Lively and Josselyn 1965: Pl. 11) and artifacts strikingly similar to our core-like pebble tools (Lively and Josselyn 1965: Pl. 55). It is clear that in terms of the published data, there are greater resemblances between the Lively Complex and the material from the San Isidro Site than anywhere else, but I suspect that to a large degree these parallels result from the fact that Lively and Josselyn have paid particular attention to artifacts that others have neglected.

Pebble Tools with One Unifacially-Worked Edge (Figure 10 A)

This grouping consists of twenty-five artifacts. They are pebbles that have a single worked edge, which is produced by heavy percussion flaking. The edge is usually slightly concave, occasionally straight, but never sinuous. More than half of the specimens are made of a light gray limestone that shows no apparent tendency to patinate. Nine specimens show marked edge battering.

	Range	Average
Number of flakes Removed	1–6	2.6
Distance From Cortex to Edge	2.8–8.6 cm.	6.1 cm.
Length of Worked Edge	3.4–7.8 cm.	5.6 cm.
Maximum Thickness	1.6–4.5 cm.	3.1 cm.
Weight	22–340 gm.	170 gm.

Comments: The size, weight, and number of flake removals of this group all fall at the low end of the pebble tool category, a fact which suggests that smaller pebbles were chosen for this very simple artifact. However, the width of the worked edge falls within the range given for the bifacially worked pebble tools.

Distribution: The highest percentage of unifacially worked pebble tools is found in Area North (6.8%), followed by the control areas (5.3%) and Area South (2.7%).

Pebble Tools With One Bifacially-Worked Sinuous Edge (Figure 10 B–I)

This grouping of one-hundred twenty artifacts constitutes the largest category of pebble tools from the San Isidro Site. All are pebbles that have one edge produced by bifacial working. The markedly sinuous edge that appears on most of the pieces is the result of alternately striking opposite surfaces of the pebble. Most of the sinuous edge pebble tools showed slightly more removals on one surface than the other.

The sinuous-edge pebble tools have been classified according to the degree of sinuosity of the edge. This has been measured by counting the number of troughs and crests seen when the piece is held so that the edge faces the observer. The formula 1/2 stands for one crest and two troughs; 3/3 denotes three crests and three troughs.

Measurements: Measurements given in Table 5 below were taken on sixty-two specimens selected at random.

Comments: The measurements indicate that the majority of the sinuous-edge pebbles have limited sinuosity and an average of between three and five flake removals. Although there are extreme variations in weight, there is a slight tendency for the smaller specimens to have less flaking and the larger specimens to have more flaking.

The averages of the three linear measurements reveal such a limited degree of variation that it is tempting to view this uniformity as culturally significant. If the constants are interpreted as cultural norms, then it would seem that the pebbles were chosen for their thickness (between 3.1 and 3.8 cm.) more than for any other single factor. It would also appear that the flaking was primarily concerned with producing an artifact that had a cutting edge between 5 and 7 cm. wide and a cortex-to-cutting-edge length of 6.3 to 8.0 cm. When it is considered that these

TABLE 5

Characteristics of Different Kinds of Sinuous-Edge Bifacially-Worked Pebble Tools

Type of Sinuous Edge	No. of Flakes Removed		Cortex to Edge Distance (cms.)		Length of Bifacial Edge (cms.)		Maximum Thickness (cms.)		Weight (gms.)		No. Specimens Examined
	Range	Av.	Range	Av.	Range	Av.	Range	Av.	Range	Av.	
1/2	2–7	3.5	3.8–10.1	6.6	3.5–8.2	4.9	1.5–4.9	3.1	43–645	182	19
2/2	3–6	4.1	3.5–13.3	8.0	3.4–9.2	5.8	1.9–5.2	3.6	43–607	242	16
3/2	4–6	5.1	5.6–14.5	8.0	4.8–12.7	6.9	2.9–6.3	3.7	142–775	306	15
3/3	7–8	7.3	2.7–15.3	6.9	2.5–9.4	6.7	1.6–7.2	3.8	9–1391	416	8
4/4	9–10	9.5	5.1–9.5	6.3	6.3–7.5	6.9	2.8–3.3	3.1	125–245	185	2
5/4	9	----	4.1	----	4.2	----	2.2	----	27	----	1
5/5	13	----	10.9	----	10.3	----	3.5	----	447	----	1

narrow limits are found among specimens that have an average range of weight between 182 and 416 grams, the constants noted seem remarkable.

Distribution: The distribution of sinuous-edge pebble tools is essentially the same throughout the site, ranging from a low of 19.4% in Area North to a high of 22.4% in the control areas. The uniform distribution of this artifact class is paralleled by that of the continuous edge bifaces of groups A and B. In this connection, it should be noted that the sinuous-edge pebble tools, and the continuous-edge bifaces constitute the two largest artifact groupings at the San Isidro Site.

Pebble Tools With One Bifacially-Worked Straight Edge

This grouping numbers only ten specimens. All of these artifacts have a straight (non-sinuous) edge, which was produced by removing one large flake from one surface and then using that flake scar as a platform for striking off smaller flakes from the other surface. Since the flaking here is not done alternately from one surface to another, the resulting edge is straight, rather than sinuous.

	Range	Average
Number of Flakes Removed	3– 8	5.2
Distance Cortex to Edge	3.8–11.2 cm.	6.6 cm.
Length of Worked Edge	2.3– 9.1 cm.	5.5 cm.
Maximum Thickness	1.8– 4.8 cm.	3.3 cm.
Weight	17–530 gm.	213 gm.

Comments: Because the average measurements of these artifacts are well within the range of the most common type of sinuous-edge pebble tools, this group is best viewed as a minor variation of the bifacially worked pebbles. The low incidence of the straight-edge pebble tools contrasts with the high frequency of the sinuous-edge grouping.

Distribution: Straight-edge pebble tools are found in minor frequencies in all of the major areas of the San Isidro Site. The two specimens from Area North were from Hearth No. 7.

Core-like Pebble Tools (Figure 9 G–H)

This grouping of eighteen bifacially flaked pebble tools has had long, as opposed to short, conchoidal flakes struck from them. Although long

flakes are uncommon at the San Isidro Site, it is possible that these artifacts served as cores for the intentional production of such flakes. Given this possibility, some measurements are supplied which may be useful in comparative core-flake studies. In the tables given below, the core-like pebble tools have been divided into three groupings, based on the kind and extent of flake scars they exhibit. Flaking listed as 1/1 has had one flake removed from each surface; 1/2 indicates one flake removed from one surface and two flakes removed from the other.

Comments: The cortex-to-cutting-edge measurement of these specimens is very similar to that recorded for the simplest sinuous-edge pebble tools. The major difference between the two groups is seen in the length of the edge formed by bifacial flaking. Most of the core-like specimens have a width of about 2.4 cm., whereas the minimum width recorded for the sinuous-edge pebble tools is twice that figure. In terms of average weight, the core-like pebble tools also seem to be smaller and lighter than the sinuous-edge pebble tools.

The core-like features of this grouping are shown in Table 7. The first flake is the first taken from the cobble, and its flake scar served as the striking platform for the removal of flakes two and three. The dimensions, as well as the length-breadth indices, are given. It should be noted that the first flake has more of an oval or conchoidal outline; whereas, the subsequent flakes are more than twice as long as they are wide. The flakes removed from these cores would have a simple prepared platform which was between 1.4 and 2.4 cm. long (noted in the table as the width of the flake); the flake-platform angle would be between 50 and 60 degrees.

The long flakes from the San Isidro Site also have simple prepared platforms, but the platforms are wider (av. 2.5 cm.), and the angles are greater (60–80 degrees) than what has been reconstructed from the flake scars described above. There is enough overlapping in dimensions, however, to indicate that some of the long flakes could have come from the core-like pebble tools. This matter is discussed later in the description of percussion flakes.

Distribution: The core-like pebble tools have a relatively low frequency in Area North (1.1%) and Area South (2.7%), but a very high incidence in the control areas (9.2%). Most of the specimens from the control areas come from Control Area 15, where they constitute 12.2% (six out of forty-nine) of the sample. The distribution of the twelve long

TABLE 6

Characteristics of Different Kinds of Bifacially Worked Core-Like Pebble Tools

Type of Flaking	No. of Flakes Removed Range	Av.	Cortex to Edge Length (cms.) Range	Av.	Width of Bifacial Edge (cms.) Range	Av.	Maximum Thickness (cms.) Range	Av.	Weight (gms. Range	Av.	Number of Specimens
1/1	2	--	4.9–10.2	6.9	1.0–3.7	2.4	2.4–5.8	4.0	56–373	192	8
1/2	3	--	4.5–10.0	6.1	1.4–2.4	2.3	3.1–4.3	3.2	30–392	129	8
Variants	3–5	4	5.1–6.1	5.6	3.2–3.9	3.6	2.6–3.3	3.0	64–80	72	2

TABLE 7

Characteristics of Flake Scars Found on Core-Like Pebble Tools

Type of Flaking	Angle of Flake	1st Flake Length (cms.) Range	Av.	Width (cms.) Range	Av.	2nd Flake Length (cms.) Range	Av.	Width (cms.) Range	Av.	3rd Flake Length (cms.) Range	Av.	Width (cms.) Range	Av.
1/1	50°	1.8–5.1	3.6	1.9–6.1	3.1	2.1–10.2	5.2	1.9–4.2	2.4	----------	----	----------	----
		LW-INDEX–85				LW-INDEX–46							
1/2	60°	1.1–5.6	3.2	1.5–3.4	2.4	1.8–4.7	3.2	0.9–2.3	1.4	1.8–5.3	3.2	1.2–2.4	1.6
		LW-INDEX–75				LW-INDEX–44				LW-INDEX–50			

flakes does not parallel that of the core-like pebble tools. Of the twelve long flakes, seven (3.4% of the flake sample) came from Area North, four (2.6%) came from Area South, and one (1.0%) came from the control areas. The last specimen came from Control Area 15.

Split Pebbles

This grouping consists of split pebbles that have been subsequently modified. There are two divisions. In the first (three specimens) a large flake scar at one end intersects the split surface to produce a rocker like effect. These pieces were then given a crude point by removing between three and six flakes from the platform created by the flake scar.

The other division (one specimen) consists of a split pebble which has had six flakes, all in the same plane, struck from the cortex at one end. The intersection of the flake scars with the split surface also produced a rocker effect. This specimen was not subsequently pointed. The first grouping has a rocker effect produced by a single flake scar intersecting the split plane; in the second grouping, the rocker effect is produced by multiple flaking. The first grouping consists of artifacts that may have been used in somewhat the same way that scraping planes were used.

Distribution: The four split pebbles from San Isidro were all found during the 1962 season. Of group 1, one came from Hearth #4 (Area North); one came from Hearth #14 (control area); and one from Control Area 15.

The single specimen of the other division came from Hearth #1, in Area South.

Miscellaneous Pebble Tools

A: This specimen, a long pebble, has been worked to a point at one end by bifacial flaking. The other end has had a single flake taken from

TABLE 8

Characteristics of Split Pebbles

Group	No. of Flakes Removed		Cortex to Edge Length		Max'mum Thickness		Weight gms.		Number of Specimen
	Range	Av.	Range	Av.	Range	Av.	Range	Av.	
1	4–7	5.3	4.6–10.8	7.5	2.9–4.4	3.5	84–369	192	3
2	6		7.2		3.0		159		1

TABLE 9

Characteristics of Miscellaneous Pebble Tools

Type	No. of Flakes Removed	Length cm.	Maximum Width cm.	Maximum Thickness cm.	Maximum Weight gm.	Material
A	5	8.7	4.5	2.5	116	Tan Patinated Limestone
B	12	11.4	5.6	3.9	227	Red Patinated Limestone
C	8	8.0	4.4	2.6	98	Tan Patinated Limestone
D	8	10.6	4.2	4.0	138	Gray Limestone

it. This specimen (from Hearth #7) of tan-to-red patinated limestone shows no patination on the flake scars, and so may have been recently made.

B: This specimen is a long pebble that has been pointed at each end by multiple bifacial flaking. In addition, one side has been worked to a sinuous edge by massive percussion flaking of ½ pattern. One of the pointed ends is unique in that it has, on one surface, five small flake scars that are quite long, almost lamellar in shape, and this flaking recalls the kind of technique found on the Aurignacian nose scrapers. This specimen is from Hearth #14.

C: This is a long pebble modified at both ends by multiple unifacial flaking. The edges so formed slope up from left to right, so that the specimen resembles a propeller. The specimen is from S 500/E 200.

D: This is a fragment of a long cobble that seems to have been brought to a point at one end by bifacial flaking. It is from Control Area 15.

UNIFACIALS

Unifacials are artifacts having one smooth, unretouched surface, which has served as the striking platform for the removal of subsequent flakes from the piece. The majority of unifacials are made from flakes, and usually it is the inner or bulbar flake surface that served as the striking platform for the retouching. Most unifaces are conventionally called scrapers.

The unifaces from the San Isidro Site, with the exception of the unifacial Clear Fork Gouges described elsewhere, are irregularly-shaped

TABLE 10

Characteristics of Limestone and Flint Unifacials

Unifacial Material	Maximum Length cm. Range	Av.	Maximum Width cm. Range	Av.	Maximum Thickness cm. Range	Av.	Weight gm. Range	Av.	No. Flakes Removed Range	Av.
Limestone	3.9–11.4	7.0	2.9–9.1	5.2	0.7–5.3	2.4	14–368	110	2–21	6.8
Flint	2.6– 5.0	3.7	1.0–4.0	2.8	0.4–2.0	1.3	6–41	17	2–22	10.0

artifacts formed by percussion flaking. Among the unifaces of limestone, the retouch is generally so limited that it is still possible to determine the major features of the flake from which the piece derived. The flint specimens, however, show more extensive flaking, and it is often difficult to identify the kind of flakes from which the artifact was made. Because of the lack of patterned form, the unifaces from San Isidro have been divided into only two groupings, those of limestone and those of flint. The sample could be classed into more conventional niches, but it would be misleading to use the conventional terminology for this material, because such use would imply that the artifacts are sufficiently patterned or consistent in form to be typed according to patterns established elsewhere. This, patently, is not the case. The San Isidro unifaces are so highly variable that, in the total range of the sample, one can find a few pieces that will fit many of the categories of other regions. (see Figure 11)

The basic features of the unifacial sample are given below in Tables 10 and 11. Additional information is supplied in the comments.

Comments: The data in Table 10 show that flint unifaces are smaller in all dimensions than the limestone unifaces. Since, as noted elsewhere, the flint sources are all small pebbles, this difference in size is to be expected. The table also indicates that the average flint uniface has had

TABLE 11

Extent of Retouching on Limestone and Flint Unifacials

	No. of Edges Retouched 1	2	3	4**	5*	Is Longest Edge Retouched? Yes	No
Limestone	70.6	20.6	5.9	2.9	_	73.6	26.4
Flint	44.5	16.6	5.6	16.6	16.6	83.3	16.6
TOTAL	61.6	19.2	5.8	7.7	5.8	77.0	23.1

* Also includes round or oval specimens that have ¾ of edge retouched.
** Includes round or oval specimens that have complete edge retouched.

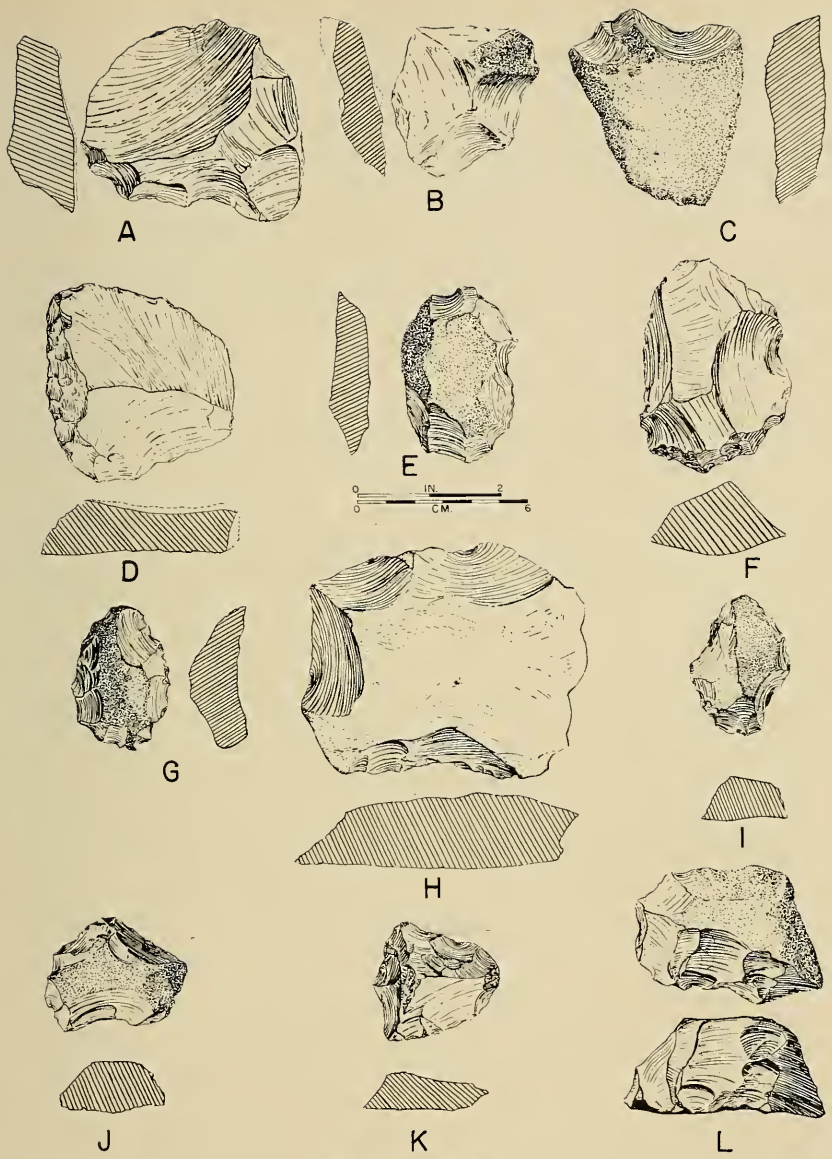

Fig. 11. Unifaces.

more retouching than the average limestone uniface, and this reflects the general practice of working the finer material more extensively.

The extent of flaking on flint and limestone unifacials is given in Table

11. Here it is seen that most of the limestone pieces are retouched along only one edge; whereas, proportionally, more of the flint is retouched.

The table also demonstrates that the longest edge was retouched in 75% or more of the specimens, whether of limestone or of flint. This is one of the most important constants in uniface manufacture at the San Isidro Site. The fact that the longest edge was retouched, however, does not justify calling these pieces side scrapers. Side scrapers are made on flakes that are relatively long in proportion to their width, and, therefore, have a true "side." The conchoidal flakes from which most of the San Isidro unifacials are made are so irregular that the use of the term side scraper is unwarranted.

In order to determine whether or not certain kinds of flakes were chosen for unifacials, the frequencies of platform types among retouched (i.e., unifacials) and unretouched flakes were compared. These data are given in Table 12.

The table shows that the proportion of flakes with simple prepared striking platforms is higher among the retouched flakes, and this in turn suggests that these flakes were chosen more than the others for unifacials. This selection was, apparently, at the expense of flakes with faceted platforms; the latter are much less frequent in the retouched samples. There is no obvious explanation for these selections, but it may be that the thicker, wider striking platforms on the faceted flakes made them more undesirable for the production of unifaces.

It is, of course, possible that the unifaces with absent or unidentifiable striking platforms were all made from faceted flakes; if this is true, the interpretation of Table 12 would be in error. In order to test this possibility, the amount of flaking found on all of the unifaces was ana-

TABLE 12

Frequency of Platform Types Among Retouched and Unretouched Flakes

Kind of Platform	Retouched[1]	Unretouched[2]
Unprepared	16.5%	12.8%
Simple Prepared	70.1%	53.1%
Faceted	13.4%	34.1%
	100.0%	100.0%

[1] Sample consists of 42 specimens. The remaining 23 unifacials could not be identified as to type of striking platform.
[2] Sample of 452 flakes.

TABLE 13

Number of Flakes Removed from Unifaces Classified by the Type of Striking Platform

Platform Type	Range of Flakes Removed	Average of Flakes Removed
Unprepared	2–5	3.5
Simple Prepared	3–14	4.5
Faceted	3–6	4.5
Platform Absent	2–10	9.5

lyzed in terms of the kinds of striking platforms retained. These data are given in Table 13.

Because the data from Table 13 indicate that the number of removals on flakes with faceted platforms averages no more than on those with simple prepared platforms, there seems to be no justification for the view that the unifaces with absent or unidentifiable platforms were especially selected from one platform type or another. The table does suggest, however, that the absent platforms are probably the result of more extensive retouching.

Distribution: Unifacials constitute only 11.2% of the total artifact sample from the San Isidro Site. The highest proportion of unifaces was found in Area North (20.0%), followed by Area South (7.6%), and finally by the Control Areas (6.6%). All of the unifaces from the latter came from Control Area 15, and were made of flint (see Table 1).

Comparisons: With the exception of the unifacial Clear Fork Gouges discussed earlier (pp. 41), the forms of the San Isidro unifacials derive essentially from the shape of the flakes from which they came. The preceding description was, therefore, concerned with the relationship between the unifaces and the flaking industry. We are now obligated to compare this somewhat amorphous assemblage to material from other areas where different descriptive and analytical approaches have been used.

In Tamaulipas, the 727 unifacials from the Sierra de Tamaulipas were divided into 15 categories (MacNeish 1958: Table 4). The four most frequent classes comprise 75% of the unifacial sample. These are: thin flake scrapers, 242 specimens (33%); large plano-convex end scrapers, 132 specimens (18%); large flake scrapers, 108 specimens (15%); and large disc scrapers, 58 specimens (95). Of the remaining 11 unifacial

classes, it was found that gouges, keeled teardrop end scrapers, and crude lamellar flake scrapers make up 15% of the sample, leaving the remaining 10% of the unifaces to be divided among 8 other scraper classes.

Most of the Tamaulipas unifacial types are confined to the more recent ceramic bearing levels which are too recent to be of concern to us here. The few obvious parallels are seen in MacNeish's large flake scrapers, which compare to the large San Isidro unifaces made of tan patinated limestone. It seems significant that, of the 3 most common scraper types from Tamaulipas, 2 apparently are not represented at San Isidro. The thin flake scrapers, which are made from long, flat, thin flakes (MacNeish 1958: 78) are certainly not characteristic of San Isidro, nor are the large plano-convex end scrapers, which are described as resembling a turtle shell (MacNeish 1958: 78). For the most part, then, the principal similarities between the material from the Sierra de Tamaulipas and San Isidro are a matter of size and crudeness.

In Texas, the published data indicate no site with unifacial assemblages similar to San Isidro. In general, large unifacials are uncommon, which may be because the material most commonly used, at least in Central and Trans-Pecos Texas, was flint, rather than limestone. Most site reports note specific uniface forms such as pointed scrapers, gravers, and spoke-shaves as reasonably frequent; I do not see these as intentionally-made forms at San Isidro. Where scrapers are categorized according to the flake form, a number of differences are apparent. In the Trans-Pecos, flakes were generally struck from unprepared cobbles (Epstein 1963) and, apparently, this technique was followed in some sites in central Texas (Johnson et al 1962). This tradition differs from that at San Isidro, where most of the flakes from which unifaces were made were struck from prepared platforms. There are probably many flaking traditions in Texas, but most of these have yet to be described. For our purposes, what is important is that the literature suggests that flakes and the scrapers made from them are not like those from San Isidro.

The crude unifacial artifacts from Ventana Cave suggest similarities to San Isidro, but I think that the parallels are largely a matter of size and coarseness, rather than in specific form. The Ventana sample contains a series of artifacts classified as planes and gravers, neither of which are represented at San Isidro. (Although scraping planes do not

occur at San Isidro, it should be noted that 3 scraping planes were reported from three sites during the 1960 survey. See Appendix 1, Table 26 B).

In regard to size, the Ventana thick-flake scrapers (Haury 1950: 217) and the planes (Haury 1950: 208–10) have about the same size as the San Isidro unifaces. Yet, while most of the Ventana pieces are large and crude, my impression is that they are better formed, and were made with more flake removals than were the San Isidro specimens.

The fact that Area North, which contained the most recent projectile point types, also had the highest percentage of unifaces (20% of the chipped stone sample) suggests that a high uniface ratio may be a late trait, at least at San Isidro. An effort was made, therefore, to determine whether uniface ratio has any wider significance. For the most part, the information was too varied to substantiate the possibility of temporal trends in uniface proportions at San Isidro, but it is worth presenting here, if only for comparative purposes.

In Tamaulipas, the proportion of unifaces from the different layers and sites in the Sierra de Tamaulipas varies considerably. There is a slight suggestion in the total data that scrapers diminish somewhat in frequency from early to later levels, but the information is much too irregular to be statistically valid. Yet, if this crude trend should prove to be true, it is exactly the reverse of the apparent sequence at San Isidro. Another noteworthy difference is that, in spite of great variations, scraper proportions in Tamaulipas generally are greater than even the 20% high recorded for Area North. The uniface trends at Ventana Cave are much more obvious than anything noted for Tamaulipas. The highest ratio of unifaces came from the volcanic debris (81.6%). The red sand produced 49%; going from layers 5 to 1 of the lower cave, the percentages ran 73.7, 61.7, 55.1, 43.1, and 39.2. Thus, as in Tamaulipas, the uniface trend is precisely the opposite of what is suggested at San Isidro, and the ratio of unifaces to the total sample is also much higher.

In Texas, there are marked trends in uniface ratios at individual sites, but there is no consistent pattern for either local areas or the state as a whole. For the most part, the scraper proportions run higher than that recorded for San Isidro. For example, the four paleo-Indian levels at the Levi Site (Alexander 1963) in Central Texas had percentages of scrapers which ran, from early to late, 25%, 59%, 80%, and 26%.

At other sites in Central Texas, where the Archaic deposits are well

enough stratified to provide a projectile point sequence, there are different if not opposing trends, and at one site, Oblate (Johnson et al. 1962), the proportion of scrapers remained relatively constant throughout. Contradictory trends are also noted for the Trans-Pecos. At the Devil's Mouth Site (Johnson 1964) the proportion of scrapers from late paleo-Indian levels through Early, Middle and Late Archaic was 12.6%, 13.5%, 8.4% and 17.3%. These are low uniface ratios, and in this respect the Devil's Mouth material resembles San Isidro. Yet, these low uniface proportions are not duplicated at other sites. For example, at Centipede Cave, which is close to the Devil's Mouth Site, the deposit contained reasonably well stratified material ranging from the Middle to the Late Archaic. Here the three analytical zones showed a trend from bottom to top which ran 31.3%, 47.1% and 62.0% These proportions are considerably greater than those noted for the Middle and Late Archaic deposits at Devil's Mouth.

At this stage of our knowledge, the diversity in uniface trends is, perhaps, the most impressive cultural fact with which we have to deal. It is difficult to determine whether the contradictory trends result from ecological or purely cultural factors; or perhaps they derive from the idiosyncracies of different typological and analytical methods. It seems significant, however, that most of the sites we have examined have a proportionately greater amount of unifaces than we recorded at San Isidro, and from this it follows that unifaces were not as important at San Isidro as elsewhere. The crude, relatively unshaped nature of our uniface sample supports this view. If we are correct in thinking of unifaces as hide and wood scrapers, the low uniface ratio at San Isidro, where large animals and woody materials seem to have been uncommon, should come as no surprise.

FLAKES AND FLAKING

The unretouched flakes from the San Isidro Site are broken down into two major categories, thinning flakes and heavy percussion flakes. The latter have been subdivided according to the kind of striking platform retained, and the number of flake scars shown on the dorsal surface.

In the usual procedure for making a well-finished tool, such as a projectile point, the flint knapper starts with a cobble and roughly shapes it to the desired form and size by heavy percussion. The piece is then

thinned, either through pressure or percussion, and given its final form.

Heavy percussion flakes are produced by striking the core with an object, such as a hammerstone or an antler billet. The core is usually hit from above, close to but not at the edge. The further from the edge the piece is struck, the thicker will be the flake and more force will be needed to remove it. Percussion flakes vary greatly in their form, size and thickness, as well as in the kinds of platforms they retain, and in their flake angles.

Thinning is a technique which is usually confined to well made bifaces, the kinds that are called knives or projectile points in the New World. After an artifact has been roughed out, it is struck *at* the edge, instead of near the edge. The flakes thus removed are usually quite thin and have very low bulbs of percussion. The striking platforms are occasionally so thin and narrow as to appear virtually non-existent, but often they are large enough that one can see their fine facets that resulted from preparing the core's edge for the removal of the flakes. Thining flakes usually have a pronounced lip on the bulbar or ventral surface, just below the striking platform. Because thinning flakes can easily be produced by a billet, they are often called billet flakes (Epstein, 1963).

It would seem, however, that the term billet flake is somewhat inappropriate, because thinning flakes that appear to be quite similar to each other can be produced by direct percussion with wood and antler billets, hammerstones, and even by indirect percussion and pressure flaking. The importance of thinning flakes is that they indicate the production of thinned bifacials, which, in the New World, at least, usually means projectile points. It follows, therefore, that non-projectile point sites should be thoroughly checked for the presence of thinning flakes before any statement of possible "pre-projectile point" status is formulated.

A few examples of typical thinning flakes are illustrated in Figure 12 G, L, and their distribution is given in Table 18. Ninety-five per cent of the thinning flakes from the San Isidro Site are of tan patinated limestone, which was the most common stone for all artifact classes. The flakes, which range in length from less than a centimeter to more than 6 centimeters, tend to follow the illustrated examples in form.

The greater part of this discussion of flakes and flaking is devoted to a discussion of the kinds of heavy percussion flakes at the San Isidro site and, as a result, the thinning flakes have received only limited at-

tention. The neglect of the latter is perhaps unwarranted, but at present I am unable to see any useful distinctions within the group, nor am I able to correlate any kind of thinning flake with a particular grouping of projectile points. The percussion flakes, however, have been more finely categorized because they seem to correlate in some instances with the distributions of particular artifact classes, and some efforts in this direction have already been given in the discussions of the heavy percussion artifacts.

Heavy percussion flakes have been analyzed under two headings: A, the type of striking platform retained on the flake; and B, the number of flake scars shown on the dorsal or faceted surface of the flake. The striking platforms are divided into three categories: unprepared, simple prepared, and faceted. An *unprepared platform* is one in which the cortex of the original cobble covers the striking platform. The presence of cortex indicates that the original surface of the cobble was struck to remove the flake.

A *simple prepared platform* is one that exhibits a relatively flat smooth surface, without cortex. The surface may have resulted from a flake scar, a break (natural or not), or perhaps some other factor, but its essential feature is its smooth, cortex-free surface. A *faceted striking* platform exhibits two or more planes formed by two or more flake scars. At the San Isidro Site, about 90% of the flakes with faceted striking platforms were struck at the peak or high point formed by the intersection of the flake scars.

Presumably, the proportion of flakes with different kinds of striking platforms has some relationship to different forms of artifact manufacture, as well as the motor habits that are involved in their production. On an obvious level, a flake with an unprepared platform probably comes from a cobble that has received little or no previous flaking; whereas, a more complex faceted striking platform probably derives from a core or core tool that has been flaked extensively. In the description of sinuous-edge pebble tools, it was observed that the edge of the piece was struck alternately from opposite surfaces. This procedure, if followed on an extensively-worked artifact such as a percussion biface, would produce flakes with faceted striking platforms. In contrast, flakes struck from some of the large, crude unifaces or scrapers would have simple prepared platforms, since these artifacts have one smoothed,

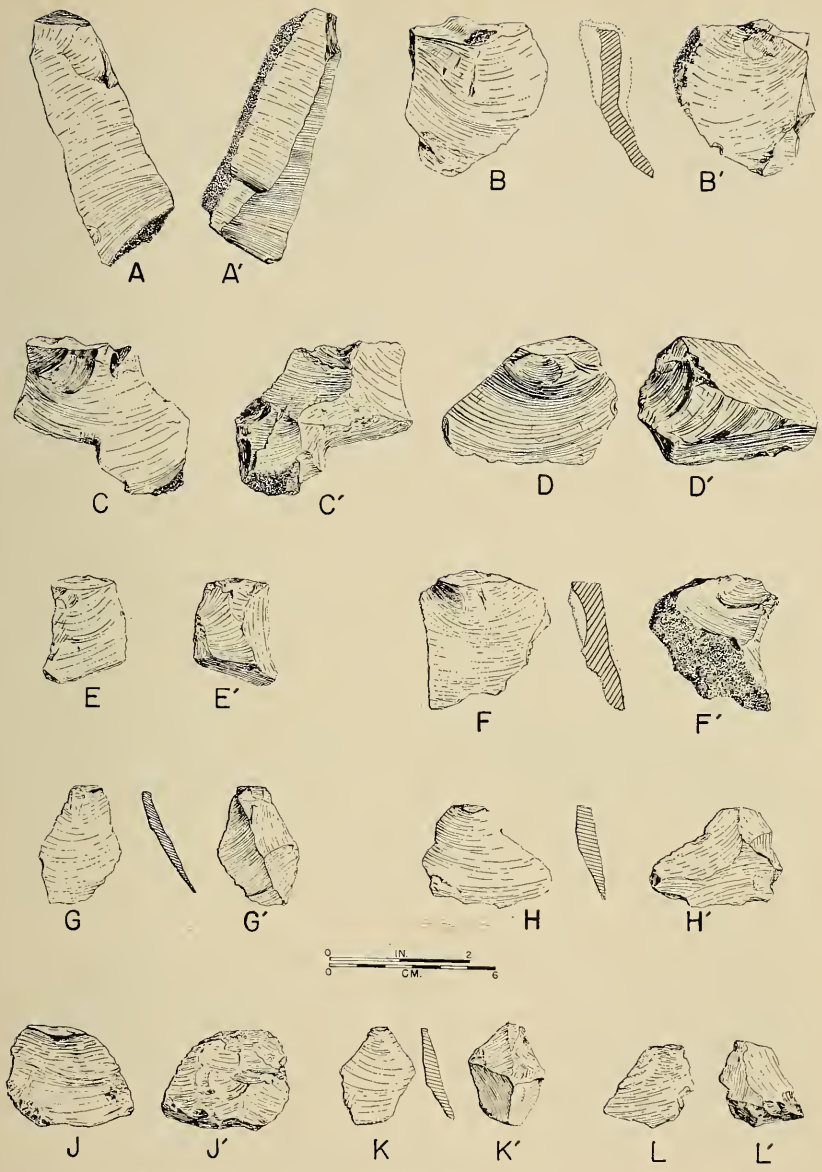

Fig. 12. Simple prepared platform flakes, and thinning flakes.

unretouched surface, which has served as a striking platform for the removal of subsequent flakes (Epstein 1964: 159).

The major kinds of heavy percussion flakes are illustrated to show both dorsal and ventral surfaces, as well as the cross-section. The striking platform is shown at the top. Flakes with simple prepared platforms are illustrated in Figures 12 A–F; those with faceted striking platforms appear in Figures 13 and 14. As can be observed, many of the flakes have a conchoidal or an irregular form, but a few, such as the long flake shown in Figure 12 A, are almost blade-like in outline. It is possible that these specimens are derived from the core-like pebble tools described earlier.

Most of the flakes are exceptionally thick, particularly in the area of the striking platform. Yet, in spite of this thickness, the bulb of percussion is not well developed. This last, I suspect, reflects the quality of the stone rather than a technique. Specimens of flint of this size would normally show very well-developed percussion bulbs, and often marked bulbar scars, as well as fissures and waves (see Watson 1950: Figure 2 for illustrations of flake terminology). Bulbar scars and fissures are notably absent from the San Isidro flakes, and only a few specimens show true waves or rings.

Of special interest are the massive flakes shown in Figures 13 E and 14 A. Both of these specimens have faceted striking platforms. Figure 14 A weighs 660 grams, and was the largest flake recovered from the San Isidro Site. The exceptionally high peak formed by the faceting is unusual even for this site. Since the flake has no cortex, it must have come from a large core that had been worked on all surfaces. We failed to recover such a core from the site.

Unfortunately, comparative material for flakes of this kind is hard to obtain. I have not seen similar flakes in Texas, largely, I suspect, because flint was much more common, both in the Trans-Pecos and in Central Texas. LeRoy Johnson (personal communication) has told me that similar flakes are frequent in southern California, but have not been reported. The closest published parallels occur in Oregon. Cressman's excellent illustrations of flakes from the Northern Great Basin suggest that a very heavy percussion technique was used there, too. All of the flake scrapers from Roaring Springs Cave and Fort Rock (Cressman, 1942: Figures 42, 44, 45, 46), however, seem to have simple prepared platforms, with the possible exception of specimen 1–8596, shown in

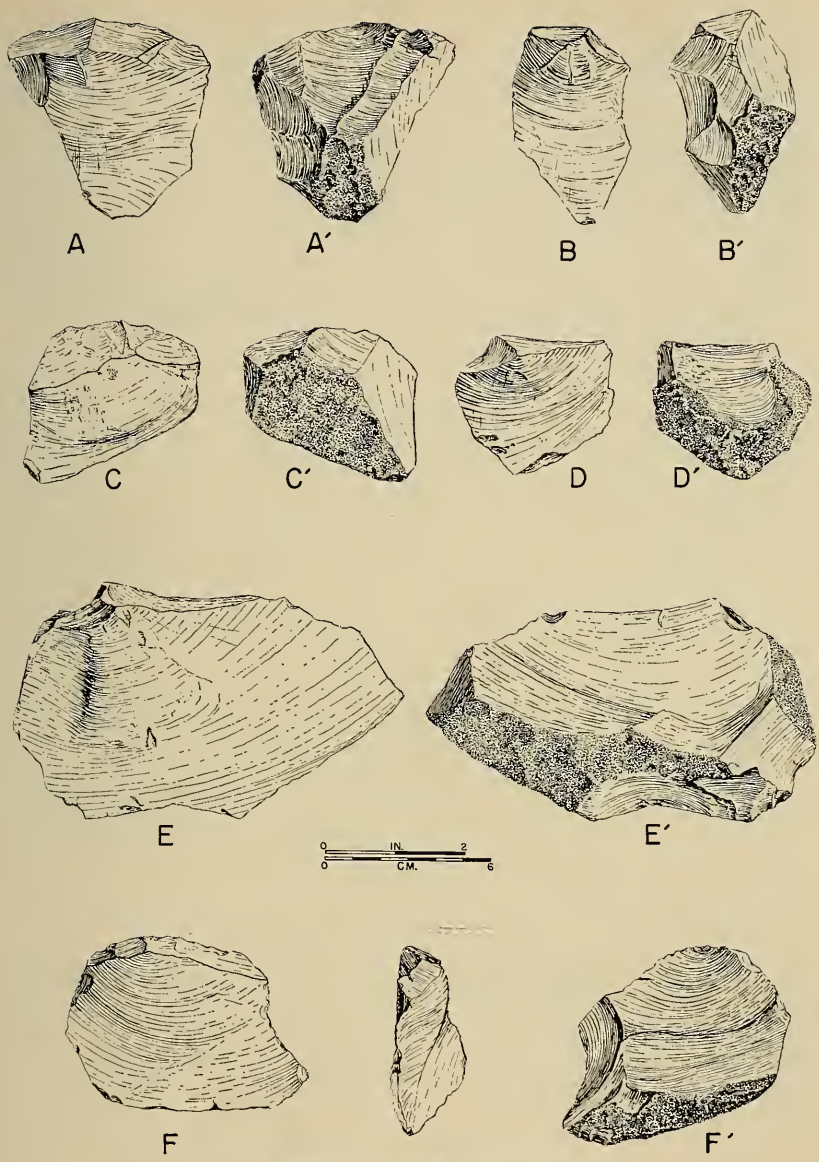

Fig. 13. Flakes with faceted striking platforms.

Figure 42. What this similarity means is not at all clear, for the heavy tool industry at San Isidro is apparently lacking at these Oregon sites.

The flakes have also been analyzed according to the number of flake

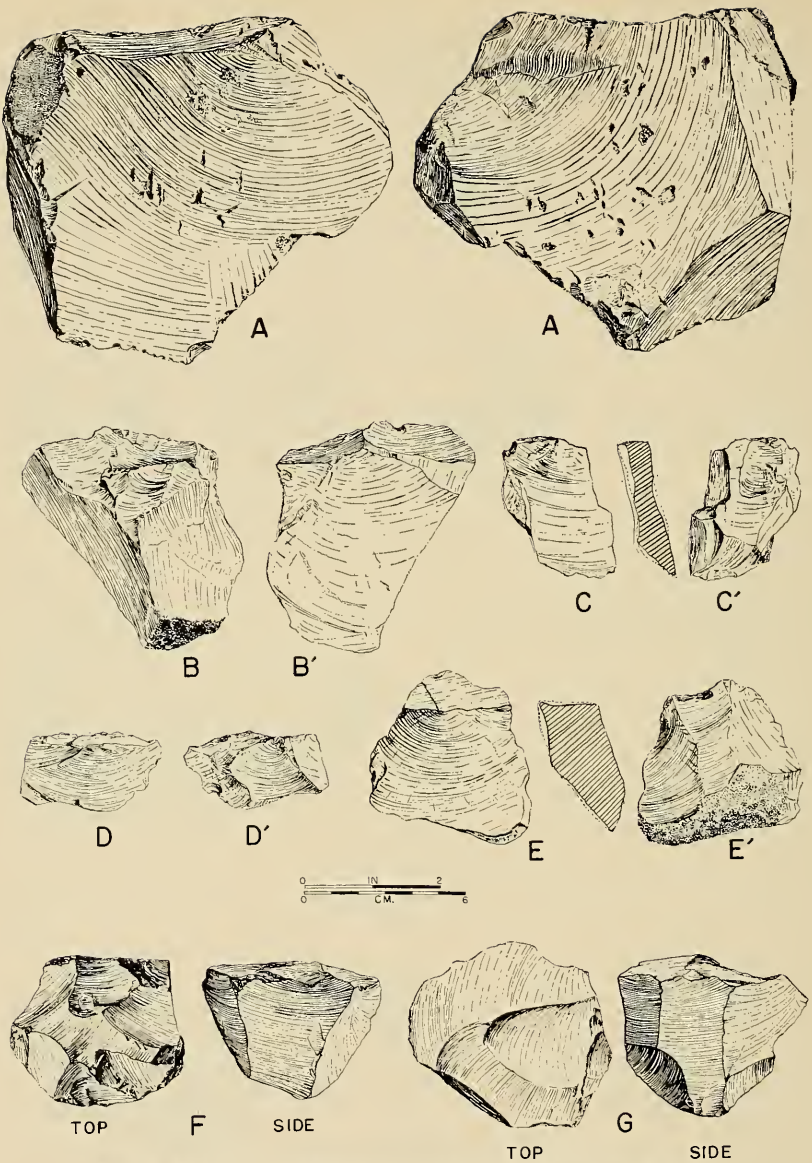

Fig. 14. Flakes with faceted striking platforms, and polyhedral cores.

scars that appear on the dorsal surface. Thus, some flakes show no scars at all; others have one, two, three, or more scars. Flake-scar frequencies provide a measure of the extent to which flaking has occurred. If the

dorsal surface of a flake is largely cortex, or shows only one flake scar, the flake may well come from a core that is only slightly worked. Thus, the more flake scars on the dorsal surface, the more the core probably has been worked.

The results of the measurements taken on heavy percussion flakes are given in Tables 14 and 15. These measurements include weight, maximum thickness, flake angle, flake length, flake width, and length of the striking platform.

Platform length refers to the maximum length of the striking platform retained on the flake. Flake length is a measurement taken at right angles to the striking platform, and is measured from the striking platform to the end of the flake. Flake width is a measurement of the widest part of the flake taken at right angles to flake length; it is, therefore, parallel to platform length. In about 50% of our specimens, the length of the striking platform proved to be the widest part of the flake, and so, in these cases, the point at which flake width was obtained coincided with platform length. As can be seen from a number of the flakes illustrated in Figures 12–14, flake width often exceeds flake length, a fact which emphasizes the conchoidal characteristics of the flakes from San Isidro. I would imagine that conchoidal flakes of this kind probably derive from cores that are much more massive than the flakes, which, at San Isidro, indicates cobbles more often than pebbles.

Perhaps the most difficult measurement to obtain was flake angle. Flake angle is defined here as the angle formed by the intersection of the plane of the striking platform with the plane of the bulbar (i.e., ventral) surface of the flake. While this measurement was relatively easy to obtain in flakes with simple prepared platforms, the angles were difficult to determine on the flakes with faceted platforms. This is because the simple prepared platforms are flat, and so the plane is easily seen. Faceted striking platforms, however, have two or more planes, which result from the individual facets; thus, it is necessary to estimate the plane of the total platform. In these cases, I believe that the measurements of flake angles may err by as much as five degrees in either direction.

Perhaps the most significant fact to emerge from the data given in Table 14 is that, although the measurements have a fairly wide range, the average thickness, length, and width of flakes with simple prepared striking platforms is about the same as those with faceted striking plat-

TABLE 14

Characteristics of Percussion Flakes

	Weight Grams Range	Av.	Angle Range	Av.	Platform Length Cms. Range	Av.	Thickness Cms. Range	Av.	Flake Length Cms.* Range	Av.	Flake Width Cms.* Range	Av.	Number of Specimen
Unprepared Platform													
Initial Cortex Flake	9–139	48	----	----	----	----	0.9–2.2	1.6	3.0–9.9	5.4	2.0–10.1	4.6	----
Prepared Simple Platform													
A: Total Cortex	10–241	53	50–80°	69°	1.6–5.5	2.8	0.9–3.6	1.5	2.6–8.7	5.0	2.8–10.2	5.1	19
B: 1 Removal	7–141	36	----	63°	1.3–5.6	2.4	0.8–2.8	1.5	2.6–8.1	4.8	1.5–6.7	4.3	41
C: 2 Removals	8–126	40	40–70°	59°	1.3–4.7	3.0	0.9–2.1	1.6	2.8–8.3	4.8	2.5–7.1	4.6	17
D: 3 or more, Still Some Cortex	3–115	36	45–70°	62°	1.2–5.3	2.5	----	----	----	----	----	----	20
E: No Cortex	4–209	34	45–90°	65°	0.9–6.9	2.6	----	----	----	----	----	----	59
F: Long Flakes	6–73	30	60–80°	68°	1.2–3.2	2.5	----	----	----	----	----	----	12
	AVERAGE	31			AVERAGE	2.6						Total	168
Faceted Platform													
A: Total Cortex	36–77	57	45–60°	53°	4.1–4.9	4.5	1.2–2.5	1.8	6.2–6.2	6.2	4.9–5.9	5.4	2
B: 1 Removal	10–81	29	60–80°	77°	2.0–7.2	4.0	0.9–2.1	1.4	3.1–6.3	4.8	2.3–7.2	4.2	11
C: 2 Removals	11–148	53	45–90°	70°	1.8–9.5	4.7	0.9–2.8	1.5	2.6–7.7	4.6	3.1–9.5	5.1	6
D: 3 Removals, Still Some Cortex	9–206	43	60–80°	70°	1.7–8.4	4.5	----	----	----	----	----	----	42
E: No Cortex, 3 or More	3–660	32	60–80°	72°	1.2–14.2	4.0	----	----	----	----	----	----	34
	AVERAGE	38			AVERAGE	4.3						Total	95

* Flake Length: Measured from Striking Platform to end of flake.
* Flake Width: Maximum Dimension Parallel to Striking Platform.

forms. (The two flakes with total cortex among the faceted striking platforms depart from the averages most of all, but they are discounted here because they have no statistical value). The data would, therefore, indicate that the kind of striking platform has no significant effect on lineal dimensions of the flake.

There is, however, a direct correlation between the length of the striking platform and the weight of the flake. Flakes with faceted striking platforms have an average platform length of 4.3 cm., and an average weight of 38 grams; whereas, flakes with unfaceted platforms have an average platform length of 2.6 cm. and an average weight of 31 grams. These figures suggest that a faceted striking platform is somewhat more effective in permitting the removal of a heavier flake than is an unfaceted striking platform. At least, this would apply if the average force used in striking off both kinds of flakes were the same.

These two sets of figures are hard to reconcile, because I would expect the average weights of both kinds of flakes to be the same, if averages were the same in thickness, length and width. Since this is not the case, it must be concluded that a faceted striking platform is a more efficient mechanism for flake removal than either the unfaceted or the simple prepared platform.

It should be noted also that the flake angles were somewhat greater on the flakes with faceted striking platforms. Since, as noted earlier, these measurements were hard to make, and not especially precise, I do not feel that the differences recorded are sufficiently great to have significance.

TABLE 15

Relationship Between Striking Platforms and Dorsal Surface of Flake

Characteristics of Dorsal Surface		Type of platform					
		Unprepared		Simple Prepared		Faceted	
		No.	%	No.	%	No.	%
Total Cortex-No Removals	55	26	44.9	27	11.2	2	1.3
Partial Cortex-1 Removal	60	9	15.9	40	16.7	11	7.1
Partial Cortex-2 Removals	27	3	5.2	17	7.1	7	4.5
Partial Cortex-3 Removals	116	9	15.9	66	27.5	41	26.6
No Cortex-3+ Removals	170	7	12.1	70	29.2	93	60.2
Long Flakes	12		----	12	5.0	----	----
Oval Cortex Flakes	12	4	6.9	8	3.3	----	----
TOTAL	452	58	100.9	240	100.0	154	100.0

Table 15 shows the relationship between the number of flake scars on the dorsal surface of the flake and the kind of striking platform. Presumably, this relationship reveals something about the extent to which the parent core has been worked. For example, flakes with only cortex on the dorsal surface probably derive from cores with little flaking; whereas, flakes with many dorsal removals should come from heavily flaked cores.

Two basic trends, which may be functions of each other, are shown in Table 15. The number of flakes with total cortex is highest on flakes with unprepared platforms, and lowest on flakes with faceted platforms. Conversely, the absence of cortex on the dorsal surface is most frequent among flakes with faceted striking platforms, and least common on flakes with unprepared striking platforms. This would indicate that flakes with faceted striking platforms come from extensively worked cores, and, at the San Isidro Site, such extensively worked cores are the heavy percussion bifaces. The high proportion of total cortex on flakes with unprepared striking platforms conforms to what we would expect to find when a core (pebble) was in the first stages of being worked.

Related to the above, but not as clearly, is the fact that flakes with unprepared and simple prepared striking platforms have about the same proportions of flakes with a single removal from the dorsal surface, and that flakes with simple prepared and faceted platforms have the same frequencies of flakes with three or more removals. The fact most puzzling to explain is the low frequency of flakes with two removals, among all of the different classes of platforms.

Flake Distribution: The distribution of the various kinds of flakes from the San Isidro Site is given in Tables 16, 17, and 18. The proveniences are given by areas, instead of by individual fire hearths and one hundred-foot squares. The analysis is based on the assumption that if the artifacts were made at the site, and not carried too far from their point of manufacture, some correlation between artifact categories and flakes should be observable.

The most obvious evidence for in-situ manufacture of artifacts is demonstrated in Table 18, which shows the distributions of heavy percussion and thinning flakes. Thinning flakes are most frequent in Area South, and least common in the control areas. This distribution correlates surprisingly well with that of thinned bifaces, which are most fre-

TABLE 16

Distribution of Heavy Percussion Flakes According to Striking Platform

	Area North		Area South		Control Areas		Total
	No.	%	No.	%	No.	%	No.
Kind of Platform							
A: Unprepared	21	10.3	11	7.3	26	26.8	58
B: Simply Prepared	107	52.4	74	49.0	59	60.8	240
C: Faceted	76	37.2	66	43.7	12	12.4	154
Total	204	99.9	151	100.0	97	100.0	452

quent in Area South, and absent in the control areas. The presence of some thinning flakes in the control areas, however, indicates that some thinned bifaces were probably made there even though none were recovered.

One of the most interesting distributional differences is shown in Table 16, which reveals that the frequencies of flakes with unprepared and simple prepared platforms is higher in the control areas. This seems to correlate with the data given in Table 17, which shows that flakes having total cortex, or only one removal on the dorsal surface, are more common in the control areas. In brief, the control areas have a higher frequency of simple flaking than either Area North or Area South. We would, therefore, expect to find a higher frequency of the simpler percussion forms in the control areas. This expectation is borne out in Table 19, which records the distribution of the heavy percussion artifacts. The data indicate that the pebble tools are somewhat more frequent in the control areas than in either Area North or Area South.

Because it is from the pebble tools that the simpler flakes derive, the

TABLE 17

Distribution of Heavy Percussion Flakes According to Number of Flake Scars on Dorsal Surface

	Area North		Area South		Control Areas		Total
	No.	%	No.	%	No.	%	No.
Total Cortex	17	8.4	11	7.3	27	27.5	55
1 Flake Scar	16	7.9	23	15.2	28	28.9	67
2 Flake Scars	22	10.8	14	9.3	11	11.4	47
3 or more Flake Scars	149	73.0	103	68.2	31	32.1	283
Total	204	100.1	151	100.0	97	99.9	452

TABLE 18

Distribution of Percussion and Thinning Flakes

	Area North		Area South		Control Areas		Total
	No.	%	No.	%	No.	%	No.
Percussion Flakes	204	71.3	151	31.3	97	86.1	452
Thinning Flakes	82	28.5	331	68.6	18	13.9	431
Total	286	99.8	482	99.9	115	100.0	883

flake distributions seem to confirm what was learned of the artifact distributions.

The above correlations, however, are on the coarsest possible level, and the question arises as to how much the data can be refined. If a complete collection were available, it should be possible to determine flake-artifact relationships much more precisely. Ideally, it might be possible to determine what proportions of artifacts were produced by counting the flakes. Conversely, the flake proportions could be predicted by noting the frequencies of certain kinds of artifacts. All of this is seemingly possible if the collections are reasonably complete and the artifacts found were made at the site.

Some idea of this approach is given in the two examples below. One of these could be viewed as a remarkably successful experiment; the other, as a failure.

In the original artifact descriptions it was observed that the average pebble tool was produced by the removal of five flakes, that bifacials average thirteen flake scars, and that limestone unifacials averaged seven. Elsewhere, it was observed that pebble-tool manufacture probably involved removing flakes that had only a slight amount of flaking on the dorsal surface. Given this data, it should be possible to determine the ratio of different classes of flakes, once the frequencies of

TABLE 19

Distribution of Heavy Percussion Artifacts at San Isidro

	Area North		Area South		Control Areas	
	No.	%	No.	%	No.	%
Bifaces	71	44.9	151	55.6	37	48.7
Pebble Tools	52	32.8	95	35.1	34	44.8
Unifaces	35	22.2	25	9.2	5	6.6
Total	158	99.9	271	99.9	76	100.1

each artifact class are known. The flake frequencies can be estimated by multiplying the percentage of each artifact class by the average number of flakes used to produce that artifact. This hypothesis is tested below with the data from Area North and from the control areas.

In Area North (See Table 19), 32% of the heavy artifacts were pebble tools, 45% were bifaces, and 22% were unifaces. By multiplying these percentages by the number of flakes removed from the average artifact we obtain the following:

		% of total
Proportional number of flakes expected from the production of *Pebble Tools*, in which 32% of artifacts are of this class. 32 x 5	160	17.8
Proportional number of flakes expected from the production of *Bifaces*, in which 45% of artifacts are of this class. 45 x 13	585	65.1
Proportional number of flakes expected from the production of *Unifaces*, in which 22% of artifacts are of this class. 22 x 7	154	17.1
	899	100.0

Thus, we would expect roughly 18% of the flakes from Area North to come from pebble tools. Since it has been noted that such flakes should have largely cortex, or one removal, on the dorsal surface, we would, therefore, expect that roughly 18% of the percussion flakes from Area North would fall in these two categories. Table 17 reveals that 16.3% (8.4% + 7.9%) of the flakes from Area North are of the predicted kinds, which is very close to the expected figure of 18%.

Although the correspondence predicted and observed results is close for Area North, the same does not hold for the control areas. Here, pebble tools constitute 44% of the artifacts, bifaces 48%, and unifaces only 7%. Following the same procedure as above, we obtain the following:

		% of total
Proportional number of flakes expected from the production of *Pebble Tools* in which 45% of the artifacts are of this class. 45 x 5	225	25.1

Proportional number of flakes expected from the production of *Bifaces,* in which 48% of the artifacts are of this class. 48 x 13	624	69.5
Proportional number of flakes expected from the production of *Unifaces,* in which 7% of the artifacts are of this class. 7 x 7	49	5.5
	898	100.1

These calculations indicate that we would expect 25.1% of the flakes from the control areas to be of the simpler kind, with no removals or only one removal visible on the dorsal surface. Table 17 shows that our predicted figure is far short of the actual percentage. The combined total of flakes with total cortex (27.5%) and flakes with only one removal (28.9%) is 56.4%.

We, therefore, have a situation where predictions about the percentages of certain kinds of flakes, on the basis of the artifact frequencies, come out well in one case and poorly in another. Why is this so? Is the logic in error, or are there a number of factors which have not as yet been considered? Almost surely, the answers are complex, but in trying to solve them, we will be moving in a direction that promises to be fruitful. The data presented here raise the possibility of doing almost as much with debitage as has hitherto been accomplished with the more finished artifacts.

Polyhedral Cores with Faceted Striking Platforms (Figure 14 F, G)

The San Isidro Site produced two artifacts that appear to be polyhedral cores with faceted striking platforms. Both specimens are of tan patinated limestone.

The first core (Figure 14 F) has no cortex. The striking platform bears seven thinning flake scars, has a pentagonal form, and is highest in the center. The sides of the core have five planes or flake scars. Although all of the flakes removed seem to have been taken from the same direction, apparently only two flakes were taken from the present platform. Both were relatively small, triangular in shape, and were struck at or close to the intersection of the facets on the striking platform. The dimensions of these two flakes are as follows: width (at striking platform) 3.7 cm. and 4.0 cm., and length 4.5 cm. and 4.0 cm.

Dimensions of this core are as follows: diameter of platform, 6.3 cm.; maximum height (platform to base of core) 4.6 cm.; and weight, 153 grams. Core flake angles: range 70–80°, average 73°.

The second core (not illustrated) retains a narrow band of cortex along one side and continuing to the base. The striking platform has a crude hexagonal form, bears six thinning flake scars, and is highest in the center. The sides have eight planes or flake scars. Six of these are essentially rectangular in shape; two are triangular. All of the flakes appear to have been taken from the same direction, but only four flakes appear to have been struck from the present platform. Three of these were struck at or close to the intersection of the facets on the platform; the fourth was struck at a flat area on the platform (simple prepared platform). The flakes removed from the present platform would have had the following dimensions:

	#1	#2	#3	#4
Length	4.4 cm.	6.2 cm.	7.0 cm.	5.5 cm.
Width	3.2 cm.	3.5 cm.	3.7 cm.	3.2 cm.

Dimensions of this core are as follows: diameter of platform, 9.4 cm.; maximum height of core (from platform to base), 6.6 cm.; and weight, 456 grams. Flake angle: range 60–80°, average, 73°.

It should be noted that although the flakes taken from both cores range considerably in length, the widths of the platforms are relatively constant. The average width for the flakes removed from both cores is 3.5 cm. This figure is lower than that recorded for flakes with faceted striking platforms of conchoidal form, where the average width was 4.5 cm.

Distribution: Both polyhedral cores came from Area South. The first (Figure 14 F) was obtained from the general area during the 1960 survey. The second was discovered in 1962, and came from a zone within 25 yards of N0/E100. This is approximately midway between Hearth 14 and our 0/0 excavation point.

Comments and Comparisons: One other polyhedral core is known for this general region. This specimen (Figure 14 G) of tan patinated limestone came from the Puntita Negra Site (Epstein 1961) about seven kilometers north of the San Isidro Site. Like the other two cores, the striking platform is faceted and highest in the center. The sides have seven flake scars or planes, but only one flake, essentially of rectangular

shape, has been taken from the present platform. The flake angles average about 70°.

While "polyhedral core" is a good descriptive term, I am not at all positive that it is appropriate for the artifacts that have been described above. In the archaeological literature the phrase has been used with some consistency to refer to the type of core from which blades were struck. The difficulty here is that there is no sure evidence of a blade industry at the San Isidro Site. Of the eight hundred eighty-three flakes recovered, only twelve seemed to fit the general requirement of lamellar blades. All twelve had simple prepared striking platforms; whereas, the two cores just described suggest that the majority of blades struck from them would have had a faceted platform. Even if the platforms were the same, or the difference were somehow reconcilable, one cannot build a case for a coreblade industry on the basis of only twelve lamellar blades. These few specimens could easily be the result of random flaking (Epstein 1964). We may ask, then, whether or not polyhedral cores could also result from random flaking. If the answer is yes, then the artifacts that I have called polyhedral cores may best be labeled "core-shaped polyhedrons"—a term which carries fewer implications, and is purely descriptive in nature.

A very similar problem exists in Texas. Excavations in Central Texas have produced about four or five polyhedral cores (none published) very similar to those from the San Isidro Site. In addition, I have seen a large polyhedral core of flint, from Uvalde County, which has a faceted striking platform. It was a superb specimen made with consummate skill. But the cores from Central Texas and that from Uvalde apparently were not associated with blades. Or, if blades were present, they were not recorded.

At this point, the data from the San Isidro Site, the Puntita Negra Site, and from Central Texas suggest three possible interpretations: (1) Cores from all localities are the random products of a flaking industry; (2) They are artifacts that look like blade cores, but have an entirely different function; and (3) They are crude blade cores, vestiges of a yet-to-be defined core-blade industry which occurs in these localities.

There are surprising parallels between the material from the San Isidro Site and that from the Olcott Site in the Puget lowland area of northwest Washington. Both sites have produced conical cores, as well as Lerma (or Cascade) points and pebble choppers (Butler 1958; 48,

Figure 5 F–G, H–L, Figure 2 A–C). The presence of three such items together at two different localities suggests a distant historical connection between the cultures of the two sites.

The Utilization of Flint and Limestone

One of the impressions obtained as a result of the 1960 survey was that the artifacts of the recent chipped stone complexes in Nuevo Leon were all made of flint, and those of the older culture complexes were primarily of limestone. In order to test this hypothesis, and to determine whether two or more lithic complexes were present at the San Isidro Site, a distributional analysis of limestone and flint artifacts was made. This data is given in Table 20. The table also details the proportions of flint and limestone artifacts in each artifact class, as well as in the total chipped stone assemblage. In an effort to double-check the data given in Table 20, two other distributional tables were prepared. Table 21 gives the distributions of flint chunks and total artifacts; Table 22 records the distributions of only the flint artifacts and flint chunks. The three tables tend to support each other. Although the data presented in each are somewhat different, the tables link Area South and the control areas a regions within the site where flint utilization was similar and noticeably distinct from Area North.

Perhaps the most significant fact to emerge from Table 20 is that, although the ratio of flint to limestone artifacts varies from one artifact class to another, flint artifacts occur in all groupings. The highest proportion of flint artifacts occurs among the unifaces and the thinned bifaces, while the pebble tools have the lowest incidence of flint. Since flint is uncommon in the San Isidro area, and particularly scarce in large chunks, it seems noteworthy that the flint was reserved for the artifacts that required extensive rather than limited flaking.

Table 20 indicates that the highest proportion of flint artifacts of all classes, except pebble tools, occurs in Area North. Because this area has the highest concentration of what are presumed to be recent projectile points (i.e., Catan), the table tends to confirm our 1960 impression that flint artifacts were more commonly used by the recent cultures of Nuevo Leon.

If flint artifacts are more frequent in Area North, and if the artifacts were made relatively close to where they were found, the random by-

TABLE 20

Distribution of Flint and Limestone Artifacts

		North		South		Control		Total	
		No.	%	No.	%	No.	%	No.	%
Thinned Bifaces:	Flint	9	52.9	14	24.2	0	0	23	30.6
	Limes.	8	47.0	44	75.8	0	0	52	69.3
	Total	17	99.9	58	100.0	0	0	75	99.9
Percussion Bifaces:	Flint	25	35.2	5	3.3	4	10.8	34	13.2
	Limes.	46	64.8	145	96.7	33	89.1	224	86.7
	Total	71	100.0	150	100.0	37	99.9	258	99.9
Pebble Tools:	Flint	5	9.6	2	2.1	5	14.7	12	6.6
	Limes.	47	90.4	93	97.8	29	85.3	169	93.4
	Total	52	100.0	95	99.9	34	100.0	181	100.0
Unifaces:	Flint	15	42.9	6	24.0	0	0	21	32.3
	Limes.	20	57.1	19	76.0	5	100.0	44	67.7
	Total	35	100.0	25	100.0	5	100.0	65	99.9
All Artifacts:	Flint	54	30.8	27	8.2	9	11.8	90	15.3
	Limes.	121	69.2	301	91.8	67	88.1	489	84.6
	Total	175	100.0	328	100.0	76	99.9	579	99.9

products of the flint flaking industry should also be more common in Area North. Table 21 bears out this line of reasoning. The tabulation was made by comparing flint chunks (that is, irregular fragments of worked flint) with the total assemblage of artifacts. The high proportion of flint working in Area North is indicated by the fact that flint chunks

TABLE 21

Distribution of Flint Chunks

	North		South		Control		Total
	No.	%	No.	%	No.	%	No.
Flint Chunks	174	50	46	12.3	17	18.3	237
Total Artifacts	175	50	328	87.7	76	81.7	579
Total	349	100	374	100.0	93	100.0	817

TABLE 22

Distribution of Flint Artifacts and Chunks

	North		South		Control		Total	
	No.	%	No.	%	No.	%	No.	%
Flint Artifacts	54	23.6	27	37.0	9	34.6	90	27.5
Flint Chunks	174	76.4	46	63.0	17	65.4	237	72.5
Total	228	100.0	73	100.0	26	100.0	327	100.0

constitute 50% of the total in Area North, but only 12% and 18% of the total in Area South and the control areas.

Although I have no relevant observational or experimental data, I would imagine that within a given culture and environment, the ratio of flint debris to flint artifacts would tend to be constant. It would, therefore, follow that the proportion of debris to artifacts should be about the same from site to site in such a case, if the artifacts were left in the general area in which they were made. On the other hand, if the artifacts were not made at the site, or if the debitage had no relationship to the artifacts found there, there should be no observable patterning of debitage-outillage ratios. With this as an operating hypothesis, Table 22 was constructed. It was hoped that the conclusions reached from it would support those obtained from Table 21.

Table 22 indicates that there is a constant relationship between flint artifacts and flint chunks. This is most apparent in Area South and in the control areas, where the proportion of artifacts (about 35%) to chunks (about 65%) is practically identical. The proportion of flint chunks to artifacts in Area North is somewhat higher (76.4% to 23.6%). The data substantiate the fundamental similarity between Area South and the control areas that we have already noted in regard to flint working, and at the same time support the comparative uniqueness of Area North in this same regard. I do not believe that the higher proportion of debitage in Area North indicates that artifacts made there were then transported, say, to Area South. Rather, the data suggest that the higher proportion of flint chunks results from the more extensive working of flint found in Area North.

Reworked Chipped Stone Artifacts

Fourteen chipped stone pieces from the San Isidro Site are reworked artifacts. This is indicated by flake scars that bear different degrees of patination. As noted earlier, the limestone from which most of the artifacts are made is black. When this material is lightly patinated, the flake scars have a gray color. Most of the artifacts from the San Isidro Site show a tan patination, which indicates even greater patina. A few specimens have deep brown to brownish-red flake scars, the color of which seems to represent the deepest patina, or possibly results from a combination of patination and lichen activity such as occurs in Alaska (Ackerman 1964).

The reworked or reflaked artifacts from San Isidro are listed below. The group is broken down into two series: those in which the original flake scars are of a red-brown patina, and the reworked scars are tan; and those specimens that are tan patinated, and have some gray flake scars. There are no specimens in our collection that have a combination of red and gray flake scars.

Original flake scars red-brown; later flake scars tan patinated:

Percussion biface, crude oval	Hearth # 5, 28–32′
Sinuous edge pebble tool	Hearth # 6, 24–28′
Percussion biface, crude oval	Hearth # 6, 24–28′
Uniface, modified to biface	Hearth # 6, 8–12′
Percussion biface, crude oval	Hearth # 8, 20–24′
Percussion biface, pointed	Hearth # 8, 20–24′
Percussion biface, pointed	Hearth # 9, 20–24′
Uniface	Hearth # 9, 24–28′
Uniface	Control Area # 15, 28–32
Uniface, modified to biface	Square N100/E300, SE¼

Total Specimens: 10

Original flake scars tan; later flake scars light gray or black:

Sinuous edge pebble tool	Hearth # 4, 28–32′
Sinuous edge pebble tool	Hearth # 14, 20–24′
Percussion biface, pointed	Hearth # 9, 4–8′
Percussion biface, fragment	Square S500/E300, NW¼

Total Specimens: 4

Comments: The fact that artifacts have been reworked after some patination of flake scars has taken place, is in itself sufficient evidence to indicate that the site has had more than one occupation. The problem is largely that of identifying these occupations and connecting the reused artifacts with them. We do not know enough about patination rates to estimate the time interval between an artifact's original manufacture and its reuse. The fact that some specimens are red patinated and others are tan and gray may not indicate great age as much as differential exposure. In this connection, it seems important that none of the red-patinated specimens have gray flake scars. Such specimens would have

had to have been exposed for a longer period than the tan patinated specimens before they were reworked.

The most striking aspect of the reused artifacts is their distribution. Ten of the fourteen specimens came from Area North, where they are confined to only five hearths. This concentration suggests that Area North has had a more intensive recent occupation than the other areas. Although the evidence is far from conclusive, it would seem that this more recent occupation is connected with the makers of Catan points. Two of the five hearths (No. 6 & 8) each produced a single Catan point, while the other three hearths (Nos. 4, 5, 9) had no points at all. However, it should be noted that in Area South the Catan points are not associated with reworked artifacts.

It is noteworthy that of the fourteen reworked artifacts, eight are bifaces, three are pebble tools, and three are unifacials. The emphasis upon bifaces here is paralleled in the total sample, in which bifaces also predominate. Our sample is, unfortunately, much too small to have much value for comparative studies, but it seems significant that, in the California desert, the few examples of reworked specimens known are unifacials (Amsden, in Campbell et al. 1937: 88).

Ground Stone: Pebble Manos

Seven pebble manos constitute the only examples of ground stone artifacts from the San Isidro Site. Three are ground bifacially and four unifacially. All are small enough so that they were presumably used with one hand.

The four unifacially-ground manos are represented by fragments too small to reveal precise data on total size. They seem to come from relatively small pebbles, none larger than fist size. The grinding surface retained on all of the specimens is very flat.

Two of the bifacial manos have been ground to a wedge-shaped cross-section. The only complete specimen is almost square (Figure 15 A). Its front-to-back dimension is 13.7 cm., while the side-to-side dimension is 11.0. Maximum thickness is 3.4 cm. The other specimen is represented by a small fragment whose thickness must have been at least 5.0 cm.

One bifacial mano was ground to a plano-convex cross-section (Figure 15 B). The plane surface is very flat and somewhat roughened by pecking. The convex surface has been ground to a very smooth finish. The

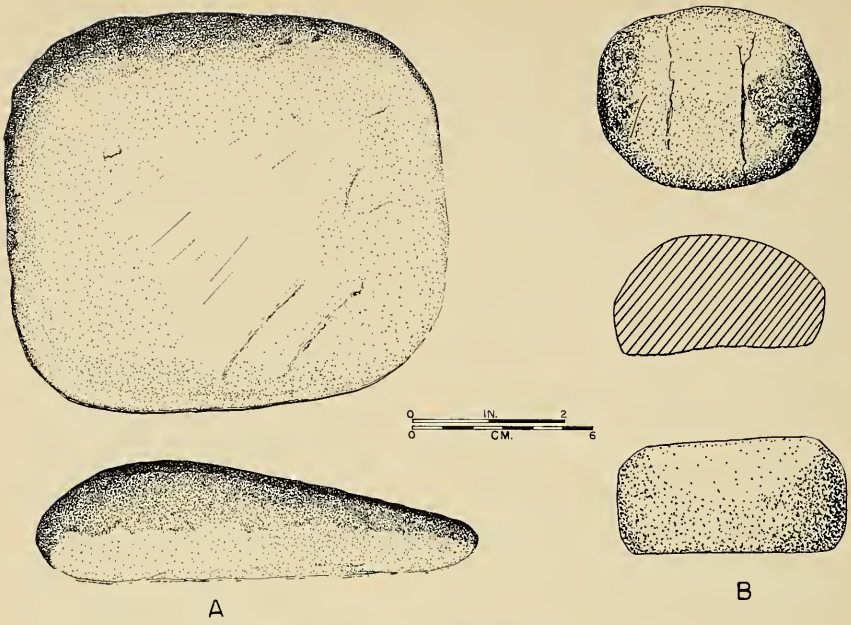

Fig. 15. Ground stone, pebble manos.

sides, which are quite rough, seem to have been left in their natural state. The mano is rectangular in outline. The dimensions are as follows: front-to-back, 5.7 cm.; side-to-side, 7.3 cm.; and thickness, 3.9 cm.

Distribution: Five of the pebble manos came from Area North; two, from Area South. The higher proportion of manos in Area North suggests that these artifacts are a later, rather than earlier, trait at the San Isidro Site.

TABLE 23

Distribution of Pebble Manos and Associated Projectile Points

Mano Type	Location	Point Type and No.
Unifacial	Excav. depth 8″	None
Unifacial	Hearth 8 (16–20′ circle)	Catan (1), Nogales (2)
Unifacial	Hearth 10 (12–16′ circle)	Miscellaneous 1A, (1)
Unifacial	Hearth 12 (8–12′ circle)	None
Bifacial-wedge	Area South-general surface	Plainview
Bifacial-wedge	Hearth 11 (4–8′ circle)	Catan (1)
Bifacial-plano convex	Hearth 6 (0–4′ circle)	Catan (1)

In the examples listed in Table 23, it should be noted that the association of the pebble mano with the Plainview points is most dubious, as the specimen so listed was obtained with no precise information on its original provenience in Area South. Of the remaining six manos, two were found without point associations, two with only Catan points, one with both Catan and Nogales, and one with the type listed as Miscellaneous 1A. Our limited data indicate that, at the San Isidro Site, pebble manos were more probably used by the makers of Catan points than by any other peoples. The relatively recent dating of Catan points is discussed elsewhere.

Comment: The apparent lateness of the few ground stone examples we have at the San Isidro Site stands in contrast to the data from Tamaulipas (MacNeish 1958) and Texas (Johnson 1964), where ground stone in the form of either pebble manos or mortars occurs in the earliest Archaic levels. It is quite probable that the relative infrequency of manos at San Isidro reflects the nature of the occupation, rather than a lack in the total cultural inventory of the people who used the site, particularly in its earlier phases.

Bifacially-ground, wedge-shaped manos are relatively common in the Pecos River area of Texas (Epstein 1963: 78, Figure 2 F). The form seems to be rare in northeastern Mexico; I found none during my 1960 survey, and MacNeish does not report any from Tamaulipas.

Bifacially-ground plano-convex manos are also unrecorded in Nuevo Leon and Coahuila; and are not reported in Tamaulipas. The form, however, occurs in the American Southwest, where, among other places, it is described from Tularosa Cave (Martin et al., 1952: 122) and Ventana Cave (Haury 1950: 313, Figure 70 B, F). Our specimen, however, does not have the asymmetrical wear described by Haury for the Ventana Cave and Cochise forms.

The presence of pebble manos at the San Isidro Site raises the question as to the nature of the companion grinding surface. I would guess that the plano-convex mano resulted from wear on a deep surface, such as that in a metate or possibly even a stone bowl, and so the absence of such artifacts is puzzling. Since we went over the site very carefully, it seems unlikely that metates were present but not observed. During the 1960 survey, I purchased two stone bowls in the town of Los Ramones, about eight kilometers from San Isidro. Although the sellers were reluctant to state precisely where the bowls were found, they said they

came from the area around Los Ramones. Since both bowls were made of an igneous stone, and the manos described above are either of sandstone or limestone, I doubt that the bowls came from the San Isidro Site.

It is quite possible that bedrock mortars were used for grinding. Mortars of this type are common in Trans-Pecos Texas, where wedge-shaped manos also occur. Although no such mortars were observed at the San Isidro Site, I have recorded bedrock mortars in areas near Saltillo, Monclova, and Galeana. In all of these cases ,the mortars had been in a soft, easily erodable conglomerate of caliche-cemented gravels. Similar formations cap the low hills surrounding the San Isidro Site, and the hearths in Area North rest at the base of one such hill.

Quartz

Fourteen small fragments of crystalline quartz were found in Area North. The fragments ranged in maximum length from 0.8 to 2.5 cm. Half of the specimens are of reasonably clear quartz, but the remainder are of a smoky white variety. All of the clear quartz fragments show flake scars indicating that attempts were made to shape or work this material. Of particular interest is one specimen which comes from the multifaceted end of a crystal. The lower surface has five flake scars, which seem to have been for the purpose of producing a flat surface, possibly for mounting.

A similar specimen, but from a large clear-crystal, was found at Cueva de la Zona de Derrumbes in 1963. The piece was almost jewel-like in appearance and was found in the chest region of a female burial (MacClurkan 1966). It may have been mounted as a pendant.

Quartz flakes and chipped quartz fragments have been found in a number of surface sites in Nuevo Leon. They occur more frequently in the sites that have been excavated, largely because of the screening process. The fact that no quartz projectile points have yet been discovered in Nuevo Leon or Coahuila suggests that most of the flaked quartz had an ornamental or religious function. Prof. Eugenio del Hoyo, of the Instituto Tecnologico de Estudios Superiores de Monterrey, informed me that quartz was considered sacred by the historic Huachichiles.

Hematite Pigment

One very small fragment of hematite pigment was recovered from the surface in Square S400/E100. One surface was ground flat.

A short distance northeast of the town of Garcia, Nuevo Leon, are a number of small iron mines where hematite pigment of excellent quality is found. Presumably, it also occurs in a number of other localities in the Sierra Madre.

Hematite Nodules

Ten small nodules of hematite, none over 1½ inch in diameter, were recovered from Area North. These nodules show no evidence of having been worked or used. It is possible that their provenience at the San Isidro Site is the result of natural, rather than human, agencies.

CHAPTER III

The Hearth Complex

This chapter represents an effort to find patterns in the artifact occurrences associated with the fourteen hearths at the San Isidro Site. As noted earlier, the hearths consisted of more or less oval concentrations of rock fragments that were exposed on the surface. There was no associated charcoal or ash, but the rocks appeared to be oxidized as if burned, and almost all were fractured. The hearths varied in diameter from 2½ to about 5 feet, but scattered in all directions from the hearth's center were fragments of burned rock. Presumably, most of these scattered pieces came from hearths that were visible when we were making our study.

Details on the sizes of each hearth, and the quantity and kinds of rock that composed it, were compiled by Robert Whallen, who tried to discover whether or not there was specialized patterning in hearth construction. Whallen noted that in addition to the burned rock, which consisted largely of discolored fractured sandstone, the hearths also contained varying quantities of whole, gray limestone pebbles. Whallen made a detailed componential analysis of the quantities of burned rock and limestone pebbles in each hearth. Co-variant charts and scatter diagrams showing distributions of rock types by number and density per square foot were devised. Unfortunately, his study failed to uncover what he considered to be culturally significant patterning in hearth construction, and so it is not presented here. However, his analysis, which is an ideal example of how to search for culturally significant correlations, is on file at the Department of Anthropology, University of Texas at Austin, and is available for study.

It will be remembered that the hearth data was collected in concentric circles of increasing radius from the center. This method gave eight analytical units for each hearth (i.e., circles with the following

radii, in feet: 0–4, 4–8, 8–12, 12–16, 16–20, 20–24, 24–28, 28–32). In retrospect the procedure was naive: we failed to obtain any provenience information which involved cardinal directions or quadrants. We assumed that people huddled more or less evenly around a hearth regardless of prevailing winds. Our conclusions are, therefore, limited by our far-from-ideal collecting methods. Obviously, our conclusions are tentative, and must be tested against more precisely gathered data.

The Limits of a Hearth

Before the data can be effectively interpreted it is necessary to form some conclusion regarding the physical and cultural limits of the hearths. Because the major concentrations of burned rock were seldom over five feet in diameter, the physical limits of the hearths are considered to be encompassed by the 0–4′ radius collecting circle. The cultural limits of a hearth present a somewhat different problem. If people used a hearth for cooking or for warmth, or for some other purpose, the distance they would stay from the center may be viewed as the behavioral limit of a hearth. Since there are no footprints, we cannot get at this problem directly, but we can measure artifact concentrations for an indirect approximation of a hearth boundary.

In order to determine whether or not artifacts were clustered around the hearths, a count was first made of the artifacts from each circle of each hearth. This procedure indicated that there was a definite tendency for artifact maximums to occur in the outer two circles. This seemed best explained by the fact that the areas of the circles were increasing as we went outward, and, therefore, we were getting more artifacts simply because we were collecting from a larger area. The material was then analyzed in terms of artifact density per square foot per circle. This method produced very satisfactory results; it revealed that the maximum density of artifacts for each hearth was within the first three circles. The only exception to this was Hearth # 9, which had a maximum artifact density in the 24–28 foot circle. It should be noted that, since very few artifacts came from each hearth in the first place, the densities of artifacts was also exceptionally low. Maximum densities ranged between 0.02 and 0.04 artifacts per square foot for most of the hearths.

The number of hearths whose maximum artifact density occurs within a given circle is listed below.

	Collecting Circles							
	0–4	4–8	8–12	12–16	16–20	20–24	24–28	28–32
No. of Hearths	5	4	4	0	0	0	1	0

Unquestionably, the most striking aspect of the data above is the absence (except in one case, Hearth # 9) of maximum artifact densities after the 8–12-foot circle. Most of the hearths have artifact maximums within 8 feet of the center. It would, therefore, seem reasonable to assume that the 12-foot radius was the cultural limit of the hearth. Carrying this line of reasoning one step further, it follows that the artifacts within the 12-foot radius of the hearth are probably associated with that particular hearth, while artifacts beyond the 12-foot radius represent a mixture of contemporary and non-contemporary occupations.

Towards the Definition of a Hearth Complex

If it is assumed that the artifacts found within a 12-foot radius of the hearth's center are contemporary, a list of these artifacts might reveal enough patterning to suggest a hearth complex. Such a tabulation is made in Table 24.

The most obvious fact to emerge from the table is that very few artifacts actually occur within the 12-foot circle of a given hearth. The total artifacts (minus flakes) ranged from 0 to 8; the average artifact count was 3.1; and the most frequent number was 2. Hearth # 14 diverged most from the sample in having the highest artifact count.

The most frequent artifact is the percussion biface; this artifact class also occurs most frequently near the center of the hearth. While most hearths have bifaces, pebble tools and/or unifaces occur in only about half of the hearths. Thinned bifaces are, apparently, the least important part of the hearth complex.

This interpretation seems to be verified by data obtained from two other hearths within a mile of the San Isidro Site. One, NL-38, located on top of the ridge just north of the San Isidro Site, contained three percussion bifaces within a 12-foot diameter of the hearth. The other, NL-39, a hearth located north of NL-38, produced a single percussion biface.

It follows, from this, that the 579 artifacts obtained from San Isidro indicate a much greater or more concentrated occupation than is indicated by the few intact hearths and burned rock scattered over the site.

TABLE 24

Artifacts Within 12′ Radius of Hearths

Hearth No.	Artifacts					Flakes		
	Pebble Tool	Uniface	Perc. Biface	Thinned Biface	Sub-Total	Perc.	Thin	Total
1	1	0	1*		2	1	9	12
2	1	1	0		2	3	4	9
3	0	0	2*		2	2	3	7
4	1	1	2		4	2	1	7
5	1	0	0		1	2	1	4
6	0	1	1		2	0	0	2
7	2	0	1	Almagre	4	3	0	7
8	0	2	4*	Catan	7	12	0	19
9	2	0	2		4	1	0	5
10	0	0	3*		3	2	3	8
11	0	2*	1		3	7	0	10
12	0	0	0		0	1	0	1
13	0	1	1		2	1	0	3
14	4*	0	4†		8	6	0	14
Total	12	8	22	2	44	43	21	108

* 1 specimen found in 0–4′ circle.
† 3 specimens found in 0–4′ circle.

The general absence of projectile points within the 12-foot circle suggests that most of the activity which centered around the hearths at San Isidro was connected with gathering, rather than with hunting. The heavy artifacts are certainly better suited to the coarser activities of rooting or chopping and pounding of vegetable materials, than to either killing or skinning activities. The lack of charcoal in the hearths precludes any precise identification of what these gathered crops may have been, but clues that probably apply with almost equal force to the people at San Isidro have been given to us in the historic sources. Cabeza de Vaca, who may have passed close by the San Isidro Site in the 16th Century (Krieger 1961), frequently mentions the importance of the prickly pear in the near-starvation diet of the people with whom he lived. Other sources note that prickly pear and mescal were cooked with heated rocks (Kelley and Campbell 1942). The San Isidro data fit this context quite well. Our data indicate that these foods were gathered with coarse tools made by heavy percussion. Almost surely, the final preparation was done close to the hearth, and with the percussion bifaces. These tools apparently were made at the site, and then discarded after use.

The question now arises as to whether Hearths # 7 and # 8 can be viewed as coeval with the Almagre and Catan points found with them. The presence of these point types within the 12-foot circle of these hearths certainly suggests that they belong there and are associated with heavy artifacts. Yet, this view runs counter to my previously-formed opinion that the heavy artifacts are earlier than these point types. At present, the only basis I can find for considering the points as intrusive is that no thinning flakes were found in either hearth. This is admittedly a weak argument; the points could have been made elsewhere.

This brings us to the relation of the flakes with the artifacts. The rough correlation between flakes and artifacts that was noted in the flake descriptions does not occur within the hearths. For example, in the description of the percussion bifaces, it was noted that the average number of flakes removed from bifaces ranged from 6.7 to 18.1. The average for the total biface sample is 12 removals. We would, therefore, expect to find 12 flakes, more or less, for every biface, at least under ideal conditions. However, only Hearth # 8 produced that many percussion flakes, and since this hearth yielded four percussion bifaces, we would expect to find about 48 such flakes.

The lack of correlation between flakes and artifacts probably results from a combination of two factors. The first is that we may have missed more than half of the flake sample. The second is that most of the artifacts were probably made outside of the immediate area of each hearth, rather than within the 12-foot circle.

CHAPTER IV

Comparative Data: Texas and Tamaulipas

Before we can intelligently interpret the material from the San Isidro Site, and put our understanding of it in proper perspective, it will be necessary to compare our data with that from other areas. Since the San Isidro Site is in Nuevo Leon, Mexico, the adjoining states of Tamaulipas and Texas should provide the most pertinent comparative information.

In the following discussion, I have tried first to evaluate the chronologies that have been elaborated both for Texas and Tamaulipas because as I see it, these sequences are not of equal value. The discussion then centers around four specific subjects which, in one way or another, implicate the interpretations of the culture complexes that existed at the San Isidro Site. In order of presentation these subjects are: (1) The Archaic and Neo-American projectile point sequences in Texas and northeastern Mexico. (2) The chronological relationship of the Lerma and Plainview point types. (3) The dating and associations of the Clear Fork Gouge. (4) Evidence of the early dating of heavy percussion artifacts.

The Data from Tamaulipas

Largely because of the work of Aveleyra and MacNeish, the archaeology of Tamaulipas is better known than that of the other two states in northeastern Mexico.

Aveleyra's survey of the Mexican side of the Falcon Dam flood pool resulted in the discovery of nine localities, eight of which contained archaeological material. Almost all of the projectile points recovered were of the types now called Tortugas, Nogales, Abasolo, and Catan (Aveleyra 1951: Lam. 1), but Aveleyra also found some points of the Gary (Aveleyra 1951: Lam. II, b, c), Langtry (Aveleyra 1951: Lam. II a), and

Almagre (Aveleyra 1951: Lam. II, g, h) types, as well as arrow points. Square-based bifaces (Aveleyra 1951; i), heavy percussion bifaces of various shapes (Aveleyra 1951), and pebble tools (Aveleyra 1951) were also recovered. A Plainview point very similar to those from the San Isidro Site was also found and reported later (Aveleyra and Arguedas 1953). Aveleyra's Falcon collection is very closely related to what I obtained from Nuevo Leon, and there seems little doubt that both collections represent the same body of cultural traditions. However, Aveleyra's report lacks evidence for sequence, and so his data are not of immediate relationship to this chapter.

By far the most significant contribution to the prehistory of Tamaulipas is MacNeish's *Preliminary Investigations in the Sierra Madre de Tamaulipas Mexico* (1958). This study presents the results of MacNeish's excavations and surface surveys made during three field seasons, 1945–46, 1948–49, and 1953–54. MacNeish not only worked out a sequence for the Sierra de Tamaulipas, but he also elaborated on culture chronologies for the Sierra Madre of southwestern Tamaulipas, and for northern Tamaulipas as well. Most of MacNeish's excavations and surveys were made in the Sierra de Tamaulipas, and this material is given most attention, both in the site and artifact descriptions and in the tabular presentation of data. The results of the less extensive work in northern Tamaulipas are presented in essentially the same fashion. The excavations made in the Sierra Madre are reported in the form of a brief comparative discussion, without the detailed listing of traits in tabular form. Since pebble choppers, a hallmark of the San Isidro assemblage, are noted only in the Sierra Madre trait list (MacNeish 1958: 167), the absence of a full presentation of the Sierra Madre material is lamentable.

Recently, MacNeish published a partial listing of the characteristics of the material from the Sierra Madre in connection with a paper on incipient agriculture in Mesoameria (MacNeish 1961: 99). His table, which lists the artifacts for the early Infiernillo and Flacco phases, in relation to the phases in the Sierra de Tamaulipas and other localities in Mexico, is the only tabular presentation of the Sierra Madre phases thus far published. It has limited value, however, for artifact names have been changed and the categories are not described, and discrepancies between the 1958 and 1961 listings for the Sierra Madre occur.

For these reasons, my discussion of the Tamaulipas material is confined solely to the sequence in the Sierra de Tamaulipas. Although there

are differences in chipped stone artifacts between the Sierra de Tamaulipas, the Sierra Madre, and northern Tamaulipas, these differences are not great enough to affect the interpretations of culture chronology and relationships offered here.

Using the sequence from the Sierra de Tamaulipas is not easy. For my own purposes, I have found it necessary to construct additional charts from MacNeish's data, primarily for the purpose of discovering precisely what was obtained. One of these charts (Table 25) is presented in this chapter. Because I have done this, some explanations seems in order.

My difficulties with the Tamaulipas report center around MacNeish's master tables, which list all of the artifacts recovered from both excavated and surface components. These tables, coupled with statements on the attributes of the Tamaulipas culture phases, give the impression that the Sierra de Tamaulipas sequence is precise; but it is not. Had MacNeish described the results of selected excavations, rather than having attempted to correlate a vast amount of surface and excavated material, a much clearer picture of Tamaulipas archaeology could have been presented. My specific objections to MacNeish's approach are given below. (Taylor 1960) has presented other criticisms.

One of the sources of confusion in reading MacNeish is that he does not present his statistical data in conventional terms. In the usual analytical procedures of archaeology, the percentages of artifacts in each level and/or zone provide the raw data for the interpretation of artifact trends. These same percentages also indicate the probable time the artifacts were made. Thus, if an artifact type constituted 30% of the sample in one level, but only 1 or 2% of the sample in levels immediately above, we would be justified in interpreting the lower frequencies as indicating intrusiveness. This kind of analysis does not appear anywhere in the Sierra de Tamaulipas report.

MacNeish's use of percentages is unique. The critical information on the number of artifacts in each level and square is not presented. After a site has been analyzed, the individual excavation units are combined into analytical layers. The analytical layers are classified into MacNeish's established phases and all artifacts within these layers are considered as belonging to that phase. Finally, similarly-named phases from various excavated sites, as well as from surface components, are then grouped together, and the artifacts of each named phase are combined into totals. The data are presented according to the total number of artifacts in a

given class (i.e., projectile points, scrapers, etc.), rather than total artifacts of all kinds. It is only at this point that percentages are given. The percentages, therefore, have no relationship to individual site sequences, but tell us only about the proportions of artifacts, within an artifact class, that have been obtained from all components classified as belonging to a particular phase. The figures are static; they have no implications for chronology.

The fact that most of MacNeish's tables combine surface and excavated components suggests that he considers them equally valid and interchangeable for deriving cultural chronologies. The impression is given that all of the artifacts found on the surface of an open site are considered contemporary. While this is almost surely not the case, MacNeish presents his charts in a way which suggests that he is not concerned with the possibility that an artifact may be intrusive in a given component.

A case in point is the temporal distribution of the Catan projectile point type. In his type descriptions, MacNeish says, "In the Sierra de Tamaulipas, this type occurs sparingly with all pottery horizons, but in the Sierra Madre it is numerous in the latest pre-ceramic Guerra Phase, and I believe it is equally early in the Falcon Dam area of Texas" (MacNeish 1958: 69). This seems to be an unequivocal statement that MacNeish considers the Catan type to be late in the Tamaulipas sequence. In the 1961 trait list, however, a single Catan point is listed for both the Nogales and La Perra phases. (MacNeish 1961: 99). This early placement of Catan contradicts the view offered in 1958 that the type is late. What has happened?

The answer, apparently, lies in MacNeish's reluctance to evaluate the conflict between surface and excavated data.

The excavation data on the placement of the Catan type in the Sierra de Tamaulipas is as follows (MacNeish 1958):

Site and Analytical Layers	*Culture Phase*	*No. Specimens*
Tmc 81 (Diablo Cave) Layer 1	Los Angeles	1
Tmc 82 (Nogales Cave) Layer 3	Eslabones	2
Tmc 314 (Armadillo Cave) Layer 1	Los Angeles	13
Tmc 314 (Armadillo Cave) Layer 2	La Salta	1
Tmr 6 Levels 1–3	Eslabones	1
Tmr 172 Levels 1–4	Laguna	2

The most significant fact about these data is that, with the exception of Layer 2 at Armadillo Cave, the Catan points were all taken from the top analytical layers of MacNeish's excavated sites. This is certainly excellent proof that the type is very late. We may question whether or not the evidence is sufficient to push the type back as far as Laguna and Eslabones times, since MacNeish has attributed the top levels of Tmr 6 and Tmr 172 to these periods exclusively. But there is no doubt that the type is very late in all of the sites where long stratified occupations are indicated.

Why then is the Catan listed as part of the Nogales and La Perra periods in the 1961 trait lists? The answer is simply that Catan points occur in one surface site classified as Nogales and at another surface site listed as La Perra. The complete list of surface sites with Catan points occur in one surface site classified as Nogales and at another surface site listed as La Perra. The complete list of surface sites with Catan points is as follows:

Period	*Site*	*No. Points*
Los Angeles	------	----
La Salta	Tmr 323	1
Eslabones	------	----
Laguna	Tmr 324	1
Laguna	Tmr 194	1
Almagre	Tmc 321	1
Almagre	Tmc 305, East end	1
La Perra	Tmc 189	1
Nogales	Tmc 290	1

Seven surface components produced seven Catan points. Of these, one was found in a site classified as Nogales Phase, and another was classed as La Perra. While it is possible to follow MacNeish's thinking, and for this we owe him a vote of thanks, his procedures lead to deceptive results. By assigning the Catan point to the Nogales and La Perra trait list, as he did in 1961, MacNeish is disregarding all of his excavation data and equating collections of dubious value with those that are well stratified and significant.

Given these problems, as well as others of a lesser order, I have found it necessary to construct additional tables from MacNeish's data in order

to discover the artifact trends at each of his excavations. I have done this in detail for Diablo, Nogales, La Perra, and Armadillo Caves, as well as Cueva Humada. From these tables, I made an abbreviated chart (Table 25) of the percentages of heavy artifacts and point types that occur also at the San Isidro Site, so that comparisons of frequencies and trends could be made easily. When all of this is done, it is apparent that MacNeish's statements about the durations of artifact types follow from a careful evaluation of his excavation data to the virtual exclusion of the material obtained in the surface components. On the other hand, the trait lists supplied for each phase derive from seriating both excavated and surface components. These trait lists still seem to be misleading. The value of the larger seriated tables is questionable.

The Data from Texas

In *An Introductory Handbook of Texas Archaeology* (Suhm, Krieger, and Jelks 1954), the prehistory of Texas was divided into seven cultural-geographical areas; Panhandle Plains, North-Central, East, Central, Coastal, Southwest, and Trans-Pecos. Of these, the archaeological materials from Southwest Texas were recognized as being most closely affiliated with what MacNeish obtained from Tamaulipas.

Since the publication of the *Handbook*, the prehistoric sequences in the East, Central, and eastern Trans-Pecos areas have been refined. Most of this refinement has been through the efforts of the Texas Archaeological Salvage Project, under the direction of T. N. Campbell and Edward B. Jelks. The longest and most important sequences, have, so far, been established in Central Texas and the Trans-Pecos; it is these sequences which will be used in the following comparative discussion. Unfortunately, the archaeology of Southwest Texas, that region which is culturally closest to northeastern Mexico, has seen no significantly new developments since the publication of the *Handbook*.

Suhm, Krieger, and Jelks recognized Paleo-American, Archaic, and Historic Stages in Southwest Texas. The Archaic materials were divided into the Falcon and Mier Foci, largely on the basis of the unpublished salvage excavations made in connection with the work at Falcon Dam. The Paleo-Indian Stage was known essentially from a few open sites in Starr County. Probably the most important locality is La Perdida, which produced a variety of artifacts spanning all of the culture stages

(Weir 1956). La Perdida shares the following traits with the San Isidro Site: pebble tools (called fist axes by Weir), bifacial Clear Fork Gouges, Lerma points, Plainview points of the deeply indented golondrina variety, Tortugas, Matamoros, Catan, Desmukes, Pandora, Gary, and Almagre (called Langtry points). Present at La Perdida, but not found at San Isidro, were Kent, Shumla, Lange, Castroville, Meserve, Angostura, a deeply concave base arrow point possibly related to Starr; Gravers and drills. It is of special interest that a number of the projectile points from this site show burin facets at both distal and proximal ends (Epstein 1963, Figure 2 c-d).

Since the La Perdida Site obviously spans an enormous period, from fluted-point times to the introduction of the arrow point, it is manifestly impossible to make any statement about the temporal provenience of the pebble choppers and bifacial Clear Fork Gouges there. However, the fact that these same traits are shared with San Isidro is of more than passing interest, and tells us that this site in Southwest Texas shared, at least partially, the same cultural tradition as the San Isidro Site.

It is clear also from the *Handbook's* description of the earlier Falcon Focus that Southwest Texas and the San Isidro Site are culturally connected. Tortugas points are the most common type of point; large crude fist axes (presumably pebble choppers) are listed as very common; *heavy* side scrapers, and *heavy* end scrapers (italics mine) are common, as are unifacial Clear Fork Gouges (Suhm, Krieger, and Jelks 1964: 140–141). These traits, however, are listed as part of a single focus, which is estimated to cover a period listed as "possibly 5000 B.C. to 500 or 1000 A.D." Hopefully, this sequence can be refined a bit in the future. It should also be noted that Suhm, Krieger, and Jelks record Abasolo and Refugio, as well as Langtry, Shumla, and Almagre, noting that the last three may be late in the Falcon Focus or may possibly belong to the Mier Focus. The Plainview, Angostura, and Scottsbluff points are said to be probable survivals from the Paleo-American stage (Suhm, Krieger, and Jelks 1954: p. 139).

The later Mier Focus differs from the Falcon Focus primarily in the introduction of Catan and Matamoros points, as well as arrow points of Perdiz and Fresno types (Suhm, Krieger and Jelks 1954: 141).

Unquestionably, one of the most important sites excavated in Texas in recent years is the Devil's Mouth Site. Here was recovered, in a stratified terrace at the junction of the Rio Grande and Devil's Rivers, evi-

dence of a long series of occupations that stretch from Paleo-Indian through Early, Middle, and Late Archaic periods (Johnson 1964). Excavations were made in two parts of the site. The first series of pits were sunk into the terrace, which contained alternating zones of sterile soil and occupation levels (Areas A & B). The deposits here was so deep (50 feet) that excavations could not be carried straight downward easily. The deepest levels of the terrace excavations produced Plainview and Lerma points.

In the second area (Area C), the excavations were in front of the terrace, where there was less overburden and the base of the deposit could be easily reached. The base consisted of two gravel layers resting on bedrock. The upper gravels yielded a series of artifacts, all considered to be Paleo-Indian. The data from the Devil's Mouth Site is especially important because the stratified occupation zones provide the best assurance of unmixed culture deposits. The chronology from this site is, therefore, as reliable as archaeological chronologies can be. Because of the work at the Devil's Mouth Site, it was possible to divide the Archaic stage of the eastern Trans-Pecos into Early, Middle, and Late periods, with a precision hitherto impossible. However, the excavations did not permit any refinements in the Paleo-Indian horizon.

The most detailed and complete archaeological sequence for Texas has so far been worked out in the central part of the state. For the Paleo-Indian horizon, the excavations at the Levi Rock Shelter (Alexander 1963) probably provide the most reliable chronology to date, though unquestionably this will be refined in the future. The Archaic periods have been gradually refined as a result of the excavations of Jelks (1953, 1962), J. Charles Kelley (1947), Thomas C. Kelly (1961), Suhm (1955, 1957, 1960), and others. Recently, as a result of the excavations at Canyon Reservoir, the Archaic periods have been divided into Early, Middle, and Late periods (Johnson, Suhm, and Tunnell 1962), and I shall rely heavily on these data in the following comparative discussion.

Archaic and Neo-American Projectile Point Sequences in Texas and Northeastern Mexico

Although there are a number of specific differences in point types between the Archaic sequences of Central Texas and the Trans-Pecos, the broad outlines of both are essentially the same. The Early Archaic

TABLE 25

Distribution of Selected Traits from Five Excavated Sites in the Sierra de Tamaulipas. Abstracted from MacNeish 1958, Tables 1–5

	Lerma		Abasolo		Nogales		Tortugas		Almagre		Gary		Matamoros		Catan		Tamaulipas Triangular		Playnview		Large Flake Scraper		Thin Flake Scraper		Large Plano-Convex Scraper		Gouges		Crude Ovoid Bifaces		Choppers		Square Base Blades		Finely Chipped Tri. & Ovoid Knives		Total* Number
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Tmc. 81–Diablo Cave																																					
Layer 1: Los Angeles			3	3.2	1	1.1	3	3.2					6	6.3	1	1.1							7	7.4	1	1.1	1	1.1	1	1.1					3	3.2	95
Layer 2: Eslabones	1	1.3	5	6.6			3	3.9																			1	1.3	2	2.6	1	1.3					76
Layer 3: Nogales			13	21.3	4	6.6	3	4.9													3	4.9	1	1.6	3	4.9	1	1.6	6	9.8							61
Layer 4: ?	7	16.6	7	16.6	1	2.4	4	9.5													1	2.4	1	2.4			1	2.4	4	9.5							42
Layer 5: Lerma	6	12.0															1	2.0			4	8.0			3	6.0	1	2.0	4	8.0	3	6.0	3	6.0			50
Layer 6: Diablo																					2	18.2							4	36.4	2	18.2					11
																																					335
Tmc. 82–Nogales Cave																																					
Layer 1: Los Angeles					2	2.4	1	1.2					1	1.2									6	7.1					1	1.2			2	2.4	7	8.4	84
Layer 2: Los Angeles			5	6.5	6	7.8	5	6.5					1	1.3									8	10.4			1	1.3	7	9.1	1	1.3	1	1.3	3	3.9	77
Layer 3: Eslabones			2	2.5	2	2.5	6	7.6					2	2.5	2	2.5					1	1.3	2	2.5	1	1.3	1	1.3	5	6.3							79
Layer 4: Almagre			12	13.1	6	6.5	15	16.3	1	1.1	1	1.1									1	1.1	9	9.8			1	1.1	5	9.8			2	2.2			92
Layer 5: La Perra			15	12.3	10	8.2	17	13.9													5	4.1	10	8.2	2	1.6	2	1.6	6	4.9	1	0.8					122
Layer 6: Nogales			19	23.5	8	9.9	4	4.9													3	3.7	2	2.5			1	1.2	8	9.9							81
Layer 7: Nogales	2	3.5	17	29.3	3	5.2													1	1.7	2	3.5	1	1.7					4	6.9	2	3.5	1	1.7			58
																																					593
Tmc. 174–La Perra Cave																																					
Layer 1: Laguna			2	3.7	3	5.6	4	7.4			2	3.7	2	3.7							1	1.9	2	3.7			1	1.9	2	3.7					1	1.9	54
Layer 2: La Perra			4	7.3	2	3.6	5	9.1	1	1.8													7	12.7	1	1.8	1	1.8	1	1.8	1	1.8	1	1.8			55
Layer 3: La Perra	1	5.3	1	5.3			3	15.8													4	21.0			1	5.3	1	5.3					1	5.3			19
Layer 4: ?	1	8.3																			2	16.6	1	8.3					2	16.6							12
Layer 5: Lerma	1	4.8																			2	9.5	1	4.8	1	4.8			2	9.5	2	9.5	1	4.8			21
Layer 6: Lerma	3	14.3																			2	9.5			1	4.8			3	14.3	1	4.8	2	9.5			21
																																					182
Tmc. 314–Armadillo Cave																																					
Layer 1: Los Angeles			10	4.7	6	2.8	4	1.9	1	0.4			19	9.0	13	6.2							22	10.4			4	1.9	11	5.2			2	0.9			211
Layer 2: La Salta							1	3.2	1	3.2					1	3.2					1	3.2			1	3.2			1	3.2							31
Layer 3: Almagre			2	9.1	1	4.5	2	9.1	2	9.1	1	4.5									1	4.5	6	27.2					1	4.5							22
Layer 4: Nogales			4	12.9	3	9.7	1	3.2													1	3.2	6	19.3	4	12.9	3	9.7	1	3.2							31
																																					295
Tmc. 315–Cueva Humada																																					
Levels 1–4: Mixed	1	0.3	18	4.6	29	7.4	25	6.3	7	1.8	13	3.3									29	7.4	42	10.7	46	11.7	9	2.3	46	11.7	7	1.8	9	2.3			394
Levels 5 : Almagre			6	4.3	1	0.7			2	1.4	7	5.0									9	6.5	20	14.4	22	15.8	3	2.2	9	6.5	2	1.4	6	4.3			139
Levels 6–7: Almagre			7	3.3	3	1.4			3	1.4	5	2.3									26	12.2	41	19.2	31	14.1	3	1.4	10	4.7	4	1.9	3	1.4			213
Levels 8–9: La Perra			1	1.9			4	7.4	2	3.7											5	9.3	7	12.9	13	24.1	1	1.9	1	1.9			1	1.9			54
																																					800

* Total Artifacts Excavated

is marked by a number of relatively large, long, narrow dart points with straight to slightly expanding stems and a barb that varies from weak to strong. In the Trans-Pecos, the Early Archaic points include Pandale and Early Barbed (Johnson 1964), while in Central Texas, the coeval types are predominantly Nolan, Bulverde, and Travis (Johnson, Suhm, and Tunnell 1962).

The Middle Archaic is characterized by contracting stem points of Almagre, Langtry, and Shumla types in the Trans-Pecos. In Central Texas, the contracting stem tradition is largely absent, but the dominant Middle Archaic point type, Pedernales, intergrades with varieties of Langtry and Shumla. Gary points, while uncommon in both Central and Trans-Pecos Texas, also occur at this time and are part of the general contracting stem tradition of this period.

The Late Archaic is marked by the introduction, or at least, dominance of side-notched points. There are numerous types, but most seem to be variations of a type widely known as Ensor (Suhm, Krieger, and Jelks, Pl. 90, 422). The post-Archaic or Neo-American periods are characterized by a variety of arrow point types, including Perdiz, Bonham, Toyah, and others.

The Tamaulipas projectile point types parallel those from Central and Trans-Pecos Texas most closely during the Middle Archaic. The major departures occur during the Early Archaic. The total Archaic sequence in Tamaulipas seems to be dominated by triangular and convex base-lanceolate dart points, which are most frequent in the earliest periods and gradually diminish through time. The Nogales and La Perra phases which seem to be the Tamaulipas equivalent of the Early Archaic, are characterized by only three point types: Tortugas, Nogales, and Abasolo. The Abasolo point, apparently, continues into the Almagre Phase in relatively large numbers, as does the Nogales (MacNeish 1958: 64). Although MacNeish considers the Tortugas to diminish to a minority type during the Almagre Phase (MacNeish 1958: 65), the data from La Perra Cave (see my Table 25) do not warrant this suggestion. The most striking aspect of the Early Archaic of Tamaulipas is the absence of points even remotely similar to the contemporary Texas types (i.e., Nolan, Bulverde, and Pandale). This, almost by definition alone, indicates a significant cultural difference between Texas and Northeastern Mexico during the Early Archaic or Nogales-La Perra times.

The Almagre period in Tamaulipas is marked by the appearance of

Almagre and Gary point types. Since these occur in the Middle Archaic of Central & Trans-Pecos Texas, I am equating the Almagre period with the Texas Middle Archaic. The Post-Almagre levels in Tamaulipas are pottery-bearing and, therefore, raise problems about equating the Tamaulipas with the Texas chronologies. I suspect that MacNeish's data was insufficient to justify definition of a Late Archaic at the time he was doing his work. Yet, the presence of Ensor, Morhiss, and Palmillas points in the Post-Almagre levels (La Salta at Tmc. 314, Eslabones and Los Angeles at Tmc. 82, and Eslabones at Tmc. 81) gives strong indication that a Late Archaic projectile point period similar to that of Texas is probably present in Tamaulipas.

The Neo-American arrow point types of Texas occur in Tamaulipas in the pottery-bearing layers. Mixed with them in Tamaulipas, and seemingly contemporary, are the Catan and Matamoras types. As noted earlier, MacNeish's excavated evidence indicates that these are very late types only.

The data from Texas on the temporal spread of the resident Tamaulipas point types are quite limited, but the data available tend to confirm MacNeish's datings. There are no good stratified data on the temporal placement of the Catan or Matamoros types, but the Tortugas type has been found in good stratified associations, although, unfortunately, in statistically insignificant numbers. The beautifully stratified Archaic deposits at the Devil's Mouth Site produced a single Tortugas point in Stratum 10–11. Since this same stratum also yielded an Almagre point, the dating of Tortugas here is Middle Archaic (Johnson 1964). At the Wunderlich Site, in the Canyon Reservoir of Central Texas, a single Tortugas point was found in the lowest zone of Midden A, where it was associated with Early Archaic types Nolan, Bulverde, Travis, and Refugio (Johnson, Suhm and Tunnell 1962). The presence of the Refugio type during this period is especially interesting, because this large rounded base type tends to intergrade with Lerma and Pandora (Suhm, Krieger, and Jelks 1954: 474), and, thus, supplies indirect support for the early dating of these types at San Isidro.

It should be noted that the Tamaulipas and Texas sequences are strangely out of line with the periods tentatively worked out so far in Tehuacan, Puebla. MacNeish's tentative Stage II, marked by the cultural complexes called El Riego and Early Coxcatlan, contains Agate Basin, Plainview, El Riego, Flacco, Tortugas, Gary, Kent, La Mina,

Ensor, Abasolo and Nogales points (MacNeish 1962: 32–33). The trait list during this very early period (estimated age 6800 to 5000 B.C.) covers projectile point types that range, in Texas and Tamaulipas, from early to Late Archaic, as well as including the Paleo-Indian stage. Because of this extreme divergence, I am reluctant to use the data from Puebla, which have so far been supplied only in preliminary form.

The Chronological Relationship of Lerma and Plainview Projectile Points

Within recent years, the bi-pointed projectile point called Lerma (Suhm, Krieger, and Jelks 1954; MacNeish 1958) or Cascade (Butler 1961) has been the subject of particular interest (Hadleigh-West 1963). It has been suggested that these points have moved from north to south (MacNeish in Forbis 1961), as well as from south to north (Hadleigh-West 1963: 61). Either view has important implications for the intercontinental spread and diffusion of this form, because somewhat similar points are also known in Asia (Okladnikov and Nekrosov 1959, Figure 2, 3). Although it has been demonstrated that bi-pointed projectile points persisted into fairly late periods in the Arctic, the first appearance of these points in the New World has not been well established.

The evidence for Tamaulipas and Texas suggests that Lerma points are coeval with Paleo-Indian points related to the Plainview type. In both states the Lerma type does not occur any earlier than late Paleo-Indian times.

In Tamaulipas, Lerma points came from three stratified sites: Diablo Cave (Tmc 81), Nogales Cave (Tmc 82), and La Perra Cave (Tmc 174). The only instance wherein Lerma points were found to the exclusion of all others was at La Perra Cave, where the two lowest layers produced four points out of a total of forty-two artifacts. The layer immediately above, which was unclassified, contained a single Lerma point out of a total of twelve artifacts for that layer. Layer 3 also contained a Lerma point, but here it was associated with one Abasolo and three Tortugas and was classified as belonging to the La Perra Phase.

At Nogales Cave, the bottom layer of the deposit (classed as Nogales Phase) contained two points classified as Lerma as well as another listed as Plainview. At Diablo Cave, the single Lerma layer produced six Lerma points and one other point named Tamaulipas Triangular. Since

this last-named type is suggested as being related to the Meserve of Nebraska (MacNeish 1958: 71), we may tentatively place the Tamaulipas Triangular in the larger Paleo-Indian tradition. In short, although Lerma points have been found alone, there is no evidence to indicate that the type underlies projectile points of Plainview-Meserve affinities. In fact, in two cases (Nogales and Diablo Caves) the two point types are associated.

Lerma and Plainview points are also associated in two areas at the Devil's Mouth Site. In the naturally stratified midden, the deepest levels that could be excavated (Stratum 23) produced a Plainview of golondrina variety, while Stratum 22 immediately above produced a Lerma-like point (Johnson 1964, Figure 17a). The next stratum, November 21, yielded an Angostura point (Johnson 1965, Figure 15K). Above these points, in subsequent strata, were other point types, some of which, because they were not found at the San Isidro Site, do not immediately concern us. However, it is noteworthy that Almagre occurs in strata 10 and 11, as does Tortugas and Desmuke. These three types are, thus, markedly later than the Plainview-Lerma horizons. Johnson classified them as Middle Archaic.

The deposits at Area C of the Devil's Mouth Site consisted of gravels which underlay the stratified terrace material. The upper gravels yielded a large series of artifacts, all of which are considered Paleo-Indian. The points show great variety but include nine Plainview golondrinas, a Meserve-like form (Figure 17h), one classed as Lerma-like (Figure 15L), and at least one that recalls that Agate Basin-Angostura tradition (Figure 17F). For our purposes, perhaps, the most interesting aspect of this collection is a series of twelve double-pointed bifacials that Johnson has listed as "Knives, Form 8" (Johnson 1964, Figure 19 E, F). These specimens conform in size and shape to the Lerma type in Texas (Suhm, Krieger, and Jelks 1954: 440, pl. 99). Even though Johnson may not wish to call them Lerma, I am not so reluctant. These specimens are certainly closer to the long, double-pointed Lerma-Cascade form than are the short, thick specimens from Tamaulipas that have the same name (MacNeish 1958, Figure 23, 24, 26, 27), or, for that matter, the contracting stem point that was also called Lerma (MacNeish 1958, Figure 23, 22).

In summary, the evidence from the Devil's Mouth Site shows that where stratification is good, Plainview underlies Lerma (in Area A–B), and, in the gravels, the two-point types are associated. The absence of

any fluted points in the Paleo-Indian deposits at the Devil's Mouth Site indicates, or at least suggests, that Lerma and Plainview golondrina do not extend back as early as the fluted-point horizons in Texas.

In Central Texas, the Levi Rock Shelter also produced Lerma and Plainview points in association with and stratigraphically above a thick-fluted point classified as Clovis. The fluted point came from Zone II, which also contained a point classified as Angostura. Above this in Zone III was a point of a type called Iztapan. Zone IV produced points classified as Plainview-Angostura, and two points listed as Lerma. Particularly noteworthy in this zone was the presence of large, thin, double-pointed bifaces listed as "Knife Type 3" (Alexander 1963, Figure 4 e–g), which are seemingly very close to Johnson's "Knife Form 8" and worthy of the designation Lerma.

The recent excavations in Puebla indicate that the association of Lerma and Plainview occurs there also. The earliest period, Ajuereado, contains Lerma and the deeply indented base point called El Riego (MacNeish 1962: 31). Johnson, who devised the Plainview golondrina point variety, considers the El Riego point closely related to it (Johnson 1964: 103), and I agree.

The association of Plainview and Lerma, or Lerma-like, points is apparently widespread; this has been noted by other observers. Alexander has even suggested that the association of the two types in such widespread localities as the Allen Site in Nebraska and the Concho sites in Arizona (Wendorf & Thomas 1951) indicate that Lerma may be part of the Plainview complex (Alexander 1963: 525).

This last suggestion is yet to be proven, but it seems especially significant that the stratified data in Texas and northeastern Mexico show Plainview associated with Lerma, and Plainview underlying Lerma. Yet, I know of no well-documented cases wherein Lerma points underlie Plainview.

The precise relationships of the Lerma type constitute one of the more intriguing problems in American Archaeology today, but I suspect we are a long way from solving this problem. One of the sources of confusion centers around the variety of forms that have been classified as Lerma and the variety of Lerma-like bifaces that have been classified as double-pointed knives. The points that MacNeish has called Lerma from Tamaulipas and those that I have called Lerma from the San Isidro Site (following MacNeish 1958) are clearly very much unlike the speci-

mens from Texas (Suhm, Krieger and Jelks 1954) or the related form called Cascade in the Pacific Northwest (Butler 1961). The Northern Lerma of Hadleigh-West (1963) has about the same range of variation as the combined U. S. and Mexican examples. It seems that we are no longer communicating when we use the term Lerma and in this world where seminars are held on less crucial problems, the Lerma problem is ripe for discussion.

The Dating and Associations of the Clear Fork Gouge

Other than the San Isidro Site, the only locality which produced Clear Fork Gouges during the 1960 survey was NL 13. This was a large open area, approximately 200 yards square, marked by clusters of hearths. The site is about 15 kilometers east of San Isidro. Altogether, thirty-eight unifacial and two bifacial gouges came from this site. The gouges, made of black or gray limestone, which had patinated a light tan color, are indistinguishable in size, shape, and color from the San Isidro specimens. Site NL 13 also contained a few pebble choppers and heavy bifaces, as well as Matamoros, Nogales, Tortugas, Catan, and Abasolo points, and a single Shumla-like point. In view of our present data, it seems reasonable to consider the pebble tools and bifaces as associated with the gouges, but the point associations present a problem. The Tamaulipas data, already cited, suggest that the Tortugas, Abasolo, and Nogales point types are part of the pebble tool-biface-gouge complex, but I found these points without gouge and pebble associations at so many sites that I am not at all sure.

The Tamaulipas data are hard to interpret in connection with Clear Fork Gouges, largely because MacNeish's illustrations show artifacts which are only vaguely like San Isidro specimens (MacNeish 1958, Figure 27, 6–7). Since the Tamaulipas gouges are listed under scrapers, whatever similarities exist must be attributed to the unifacial specimens. MacNeish notes that gouges are ". . . found only in the Almagre, La Perra and Nogales phases of the Sierra de Tamaulipas (MacNeish 1958: 79)." Although this statement helps to date the unifacial gouges, we must go elsewhere for the dating of bifacial Clear Fork Gouges.

The data from Texas, like that from Tamaulipas, show that Clear Fork Gouges of unifacial and bifacial types have a wide temporal spread, going from Paleo-Indian to Neo-American times. I think, however, that

this reflects the excavation of mixed sites rather than the real temporal placement of these artifacts. The well-stratified Devil's Mouth Site produced only two bifacial gouges; these were associated with the Paleo-Indian material in Area C (Johnson 1964: 63). The Devil's Mouth Site also produced a unifacial gouge, in higher levels, associated with Almagre, Shumla, and other Middle Archaic types. This same association of unifacial gouge with shumla points also occurs at Site NL-13 and, thus, tends to confirm MacNeish's placement of the gouge (unifacial) as late as Almagre times.

In 1958, we excavated Damp Cave, a site located fairly close to the Devil's Mouth Site. This small rock shelter had a shallow deposit about three feet deep; there was no clear stratification of artifacts. However, the lower levels of the site and the cracks in the bedrock produced a few Lerma points and bifacial gouges. At the time I wrote the report (Epstein 1963) I suggested that the absence of Lerma points and bifacial gouges in similar deposits at nearby Centipede Cave pointed to the possibility that bifacial gouges and Lerma points are part of a still earlier complex. This suggestion has been supported more recently by the association of both Lerma and Plainview points and bifacial gouges at the Devil's Mouth Site, as well as at the San Isidro Site. However, the data are far from clear. At this point, we can only assert that the evidence from Trans-Pecos Texas shows bifacial Clear Fork Gouges associated with Lerma and Plainview points, while unifacial Clear Fork Gouges occur with Shumla points. Both types may well have a greater time spread. I know of no Clear Fork Gouges with sound stratigraphic associations in Central Texas, but they seem to occur in all periods. It seems significant, however, that apparently neither bifacial or unifacial gouges were found at the Paleo-Indian Levi Site.

MacNeish has observed, "In the valley of Mexico some of the beaked scrapers assigned to the Chalco Complex (de Terra 1949, Pl. 12 f) are gouges, and one of the tools that Aveleyra found with the mammoth near Tepexpan (Aveleyra and Maldonado 1953, Figure 105, 4) was a gouge" (MacNeish 1958: 79). I do not believe that MacNeish's observations, which indicate an early dating of gouges, apply to the examples of the Clear Fork type discussed here. I have examined the cited illustrations and cannot see any correspondence to the type as it is known in Texas and as it occurs at the San Isidro Site.

Although the Clear Fork Gouge does not seem to occur in southern

Mexico, both bifacial and unifacial Clear Fork Gouges occur over much of Nebraska (Holder and Wilke 1949). Its appearance in the early Frontier complex, where it is associated with Plainview points and ovoid knives that resemble the Lerma-like knives from the Levi Site (Alexander 1963: 525; Holder and Wike 1949, Figure 67r), indicates strong parallels with the Paleo-Indian material from the Devil's Mouth Site and with material from Area South at San Isidro. At this writing, the distribution of the Clear Fork Gouge and/or sub-types seems to suggest Plains connections rather than Desert Culture influences, because gouges, apparently, are not part of the early southwestern or Great Basin cultures.

The Evidence for the Early Dating of Heavy Artifacts

MacNeish's excavation data for the Sierra de Tamaulipas supply abundant evidence for the prevalence of heavy core tools and unifaces in the earliest phases. Although the inter-site data are not consistent, indications are that heavy artifacts appear in their highest frequencies in Diablo and Lerma times and dwindle to low frequencies by the Almagre Phase. After that, it seems that the appearance of these artifacts could well be intrusive.

Although only one *pebble end scraper* was found in situ, it belonged to the Diablo complex (MacNeish 1958: 75). *Large flake side scrapers* ". . . occur in both the Diablo layer and all the Nogales layers, and appear to die out in Almagre times" (MacNeish 1958: 78). These correspond essentially to the retouched large flakes from the San Isidro Site. *Large plano-convex end scrapers* are noted as ". . . always found in Lerma levels" and others are listed for Nogales, La Perra, and Almagre phases. This scraper form, however, reaches its highest Frequency in the earliest Nogales and Lerma periods, except at Site Tmc. 315, where the deposit is partially mixed and tends to differ from the other sites in its proportions of artifacts during La Perra and Almagre phases. Significantly, the frequencies of these scrapers are only between 1 and 2% in post-Almagre levels. Although *ovoid bifaces* are noted as occurring in all horizons, it seems noteworthy that MacNeish observed, "There is a slight tendency for the thicker blank like ones to be in the earlier horizon" (MacNeish 1958: 85). There are, however, some trends at a few of the sites which suggest that the category is much more frequently of early origin than of late origin. At Diablo Cave, *ovoid bifaces*

constitute 36.4% of the total artifacts in the Diablo layer and between 8 and 9% of the artifacts in the following Lerma and Nogales layers. In the later Eslabones and Los Angeles layers, these artifacts constitute only between 1 and 3% of the sample from those layers. A somewhat similar trend is seen at La Perra Cave. No clear trends, however, are visible for *ovoid bifaces* at either Armadillo or Nogales Caves; at Cueva Humada, it would seem that maximum popularity of the artifact increases from La Perra to Almagre times.

Choppers seem to be early in the Sierra Madre. MacNeish notes that ". . . choppers are popular in the Lerma and Diablo components; they appear to be on the wane and little used in Nogales, Almagre and La Perra times. (MacNeish 1858: 86)." *Large chipped discs*, which are, apparently, similar to our pebble choppers are noted as ". . . confined to the La Perra and Almagre horizons with the exception of a few that occur with Nogales material north of the Soto la Marina River" (MacNeish 1958: 86). *Square-base bifaces* are also primarily early. MacNeish states, "This type occurs mainly in the Lerma levels" (MacNeish 1958: 86). He also notes that it occurs in significant amounts as late as the Los Angeles Phase. *Square-base bifaces* occur at both Nogales and Armadillo Caves. Nogales Cave contained three specimens in the upper two layers; Armadillo Cave had two specimens in the first layer. I suspect that these numbers and percentages are too small to be statistically significant.

Surprisingly, there is no evidence from Central or Trans-Pecos Texas which shows temporal trends in heavy pebble tools, bifaces, or other artifacts. In view of the extensive amount of field work done, the absence of trend cannot be viewed as lack of evidence. For the most part, it would seem that heavy artifacts were not commonly used in the Trans-Pecos, although, apparently, they were made in all time periods. In Central Texas, large chunks of tabular flint were used for various purposes, and core-like chunks seem to occur over a wide time period; yet, no trends are obvious. The widespread occurrence of tabular flint may explain why pebble tools are not common in Central Texas.

CHAPTER V

Summary and Interpretations

As noted earlier (Epstein 1961), the 1960 archaeological surface survey left the impression that the Archaic and Neo-American lithic industries in Nuevo Leon were confined to small flint artifacts. In contrast, the Early Man assemblages seemed to be oriented primarily around the production of large bifaces and pebble tools of silicified limestone. The most frequent projectile points obtained during the survey were of Tortugas, Nogales, Matamoros, and Catan types (see Appendix I, Table 26). These, as well as other stemmed and notched forms, were usually associated with small bifaces of flint. The San Isidro Site was chosen for extensive work because it contained Lerma and Plainview points, pebble tools, and large bifaces; thus it seemed to be primarily an Early Man campsite.

The work at the San Isidro Site during the summer of 1962 had several purposes. We hoped to be able to define the various artifact complexes that we suspected were there and to arrange these complexes chronologically. We expected to obtain enough geological, faunal and floral data, as well as carbon, to date the site and place it in its proper ecological setting. In order to accomplish these ends, we excavated in two areas and made detailed surface collections from a selected series of 100-foot squares and hearths.

The excavations yielded very little. Artifacts were exceptionally scarce, and the soil contained no charcoal, bone, or pollen. About the only thing we could say about the artifacts was that they were in a layer of soil and gravel. Since the artifacts and burned rock were scattered over the excavation area in a zone about 1 foot thick, it would seem that the site had more than one occupation. Associated with the artifacts, as well as under them, were small land-snail shells of the same kinds found today at the site.

The most fruitful methods of investigation proved to be surface collecting and mapping. These procedures not only increased the artifact collections with the addition of new material but also gave data on the distributional differences of artifact categories within the site.

Scattered over the entire site was a series of heavy percussion bifaces and pebble tools that were invariably associated with heavy percussion flakes. The relatively uniform distribution of these artifacts over the entire site stands in marked contrast to the differential distributions of the rest of the artifact assemblage. The two control areas, Hearth 14 and Control Area 15, were unique in that they contained heavy percussion artifacts without any of the thinned bifacials.

Area South was marked by a concentration of projectile points of Lerma and Plainview types and bifacial Clear Fork Gouges. A few Desmuke and Tortugas points also occurred. These types were not found in other parts of the site. Localized primarily in Area South were Pandora points, square-based bifaces, and unifacial Clear Fork Gouges. The highest concentration of thinning flakes, the product of thinned biface manufacture, was also found here.

Area North was dominated by Catan points, along with some Nogales, Almagre, and Gary points. This area was characterized by a high proportion of flint artifacts, especially unifaces, as well as well as by a high freqency of battered chunks of flint. Most of the reworked or reused artifacts appeared in Area North.

There are a number of reasons for believing that the San Isidro Site has undergone more than one occupation. The excavation data, the presence of complete hearths amidst scattered burned rock, the distributional differences in artifacts, the variety of projectile point types, and the reuse of artifacts all point to several occupations of the site. The problem now is to identify these occupations and reconstruct their respective artifact complexes.

A rough outline of culture history at San Isidro is suggested by the artifact distributions.

The earliest occupation is best illustrated by the material from the con areas, but this occupation seems to have covered the entire site. It is characterized by the production of heavy percussion bifaces and pebble tools, and possibly of some unifacials. It is possible that a few thinned bifaces were made at this time; for, although thinned bifaces have not been found, thinning flakes do occur.

The second occupation is indicated by the material from Area South. It is marked by the appearance of Lerma and Plainview points, bifacial Clear Fork Gouges, and probably unifacial Clear Fork Gouges and Pandora points. Most of these artifacts are made of silicified limestone. It is probable that the heavy percussion artifacts of the earliest occupation continued to be manufactured during this time.

The third occupation was, apparently, sporadic and can be divided into at least three periods. Most of the evidence comes from Area North. It is characterized by Nogales, Tortugas, Desmuke, Gary, Almagre, Matamoros, and Catan points. Flint is used more extensively than previously, and unifacials seems to be more common. At some time during this extended period or, perhaps, throughout it, heavy percussion bifaces of the earlier occupations were reworked and reused.

This cultural sequence is obviously not firmly established. The early placement of the heavy artifacts is partly based on my views formed in 1960 and the fact that heavy artifacts are distributed over the entire site, whereas the thinned bifaces are not. The reason for placing Plainview, Lerma, and Clear Fork Gouges together is simply that they are found together in Area South but are absent in other parts of the site. The same logic is involved in the later placement of Gary, Almagre, Catan, and Nogales points. This kind of evidence is not conclusive, because spatial juxtapositions are not proof of contemporaneity.

The second and third occupations are reasonably well verified by the comparative data. Lerma and Plainview points are, apparently, contemporary in Texas and Tamaulipas, as well as in other localities. Thus it is quite probable that they are at least roughly coeval at the San Isidro Site. Since bifacial Clear Fork Gouges are associated with Plainview and Lerma points in Texas and Nebraska, they probably have the same associations at the San Isidro Site. Although confirming data from Texas are absent, heavy bifaces, pebble tools, and crudely worked flakes occur primarily with Lerma points in Tamaulipas, and are probably integral to the second occupation here.

The Tortugas, Nogales, Almagre, and Gary points are almost surely later. They seem to represent scattered occupations that cover MacNeish's Nogales, La Perra, and Almagre phases, or the Early and Middle Archaic periods. MacNeish's data indicate that heavy tools were used during this period, but in greatly diminished frequency, and there is nothing in our distributional data that conflicts with that view. Although

the evidence is very slim, it would seem that the unifacial Clear Fork Gouges fit in here somewhere. I suspect that the examples of reworked heavy artifacts, which were found primarily in Area North, were probably produced at this time. Since the artifacts mentioned here are scattered over both Area North and Area South, the impression gained is that the post-Plainview-Lerma occupation is more transient than was its predecessor.

The Catan and Matamoros points at San Isidro are probably the most recent artifacts at the site. The Tamaulipas data indicate that these point types occur in the top of all excavations and are associated with pottery. At the San Isidro Site, the only ceramics recovered were sherds of 20th Century culinary wares.

The most difficult occupation to verify is the first. As I conceive it, this occupation is characterized primarily by heavy percussion artifacts (i.e., bifaces, pebble tools, and crudely worked flakes), but some thinned bifaces may also occur. The evidence for the latter occurrence rests on the presence of thinning flakes, which were found in both areas. What was thinned there, I do not know, but it seems quite possible that it was something similar to the thinned bifaces of the second occupation. The difference between the first two occupations may well be quantitative rather than qualitative. I know of nothing resembling the first occupation in Texas, but in Tamaulipas the Diablo Complex from the base of Diablo Cave seems quite similar. Unfortunately, the artifact sample from the Diablo Complex is much too small to have utility for comparison.

It should be apparent that the first occupation, as here conceived, could be taken as representing the hypothetical Early Lithic of Willey and Phillips (1955) or the pre-projectile point stage advanced by Krieger (1962, 1964). Krieger's most recent statement emphasizes that the pre-projectile point stage was one where "All objects were made by percussion . . . Often, but not always, they are quite large and heavy. Pebble tools are also present, but vary greatly in frequency. The fact of percussion does not adequately describe the technology; more important is the apparent inability of peoples of this stage to flatten and thin the artifacts enough to produce what would be called projectile points and knives of thin bifaced form" (Krieger 1964: 42).

If the few thinning flakes found in the control areas could be explained as belonging to a later occupation, there would be little difficulty in

identifying our first occupation with Krieger's pre-projectile point stage, at least on morphological grounds. But I see no way of making such an identification without shamefully manipulating the data. This, perhaps, points to one of the most difficult aspects of the pre-projectile point hypothesis. Up to now, the data that have been used to support it are based on the finished artifact with little reference to the flake sample. Until it can be demonstrated that thinning flakes do not occur in sites lacking thinned flakes, the pre-projectile point hypothesis is on very shaky ground. Yet, even if this hypothesis should be proven invalid, Krieger's efforts have emphasized that there are, in various parts of the New World, early chipped stone industries characterized by heavy percussion flaking. The San Isidro material, particularly from the first occupation, is typologically similar to these industries. Until we can get more detailed comparative data on flaking technology, the significance of these typological similarities must remain very obscure.

Dating the first two occupations at the San Isidro Site is most difficult. The lack of charcoal, pollen, and bone prevents us from using many of the standard dating procedures in archeology. The only clues to the paleo-ecology of the site are the land snails, which were found mixed with the artifacts, as well as below them in sterile soil. Since the same snails (*Bulimulus*) are found at the site today, it would seem that somewhat similar climatic conditions existed when the site was occupied. When this information is combined with the cultural evidence, an early post-Pleistocene dating is suggested. Such a placement agrees more with the dating of Lerma and Plainview points in Texas than with the earlier dates given these types in Tamaulipas. The Diablo Complex, which I have suggested is paralleled by our first occupation, is placed before the Two Creeks Interval, or prior to 10,000 B.C. (MacNeish 1958, Table 31). Something is wrong somewhere, but at present I see no way of reconciling the conflict.

Probably the most significant fact to emerge from our work was that the San Isidro Site produced fourteen Plainview points, four Lermas, some Clear Fork Gouges, a whole series of heavy bifaces and pebble tools, and some thick, crudely retouched unifaces, all seemingly contemporary. But what does this mean? Does it represent a single complex of ancient vintage? Is the complex a fusion of more than one culture, or is it the remains of two or more separate cultures that have not yet

been defined? Our future work in northeastern Mexico should answer these questions, but the temptation to speculate is irresistible.

One of the most useful concepts in American archaeology has been the idea of a Desert Culture (Jennings and Norbeck 1955), which I interpret as a way of life in almost total contrast to that of the Paleo-Indians. As the concepts were originally conceived, the Paleo-Indian hunters of the Plains hunted only large game, while the people with Desert Cultures hunted animals, gathered and ground berries and nuts, and made baskets and sandals. As a reaction to the concept of a purely hunting culture, the Desert Culture concept seems to be the other side of the coin. It is quite probable that both concepts err on the side of extremism, or that those who lived in arid regions also hunted big game, when it was available, and that the Paleo-Indian hunters of the plains also gathered.

Here I follow Cressman, who has pointed out that ". . . the almost pure hunting complex of the Folsom is as difficult to explain as the pure gathering complex of the Cochise. Both pictures as of the present may be correct, but it is also true that both may be one sided based upon the selective evidence with which the archaeologist is so often forced to work" (Cressman 1951: 194). Confirming Cressman's views is a recent study of the early periods on the Plains, which shows that, although big game meat was a staple, diets were supplemented by wild-plant gathering and small-animal hunting (Wendorf and Hester 1962: 168).

In this connection, the San Isidro Site seems to represent an adaptation of a Paleo-Indian culture to a desert economy. The site is in an arid region that is a geographical extension of the southern Plains. The complex of Plainview points and Clear Fork Gouges, heavy bifaces, pebble tools, and crudely-worked flakes represents the kind of cultural mixture we would expect if people with a plains hunting economy adapted themselves to a desert gathering environment.

Although the area of the San Isidro Site may have been equally accessible to people from the desert cultures of the West, I find it difficult to consider the San Isidro material as a blend of two separate cultures. The variety of Southwestern point types does not occur here, nor does the heavy representation of ground stone artifacts that we associate with the desert cultures.

POST SCRIPT

Except for editorial revisions, this report remains essentially as it was written in 1965. Since then considerable work has been done both in Texas and in Mexico which implicates our interpretations of the San Isidro Site. In so far as dating is concerned, the subsequent excavations at the Devil's Mouth Site have proven most important. Charcoal, radiocarbon dated at B.P. 8780 ± 310 years, was obtained from a zone that is believed to equate with Johnson's Strata 23 (Sorrow 1968:48). If correct, this would give us a terminal date for the Plainview golondrina points at the Devil's Mouth Site, and, by extension, date the second occupation at San Isidro.

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Appendix 1

ARCHAEOLOGICAL LOCALITIES IN NUEVO LEON, MEXICO

The following is a list of the sites visited by the writer during the archaeological survey of 1960. The material obtained is presented in Tables 26 A&B, and 27. Sites are noted only for the state of Nuevo Leon; the Coahuila material will be published later.

The sites are listed in the order of their discovery, and the day on which they were first seen is stated. Locations are given as accurately as possible by noting distances from towns, villages, and streams, or by the names of rivers, arroyos, etc. In order to facilitate their placement, I have referred to the maps prepared by the Comision Intersecretarial Coordinadora del Levantamiento de la Carta Geographica de la Republica Mexicana. These exceptionally accurate maps are drawn to a scale of 1: 500,000. They are issued by quadrangles, which are subdivided into 10-kilometer squares. Those quadrangles of concern to us here are Monterrey 14R-VII and Nuevo Laredo 14R-V, both published in 1958.

Each site is listed in terms of the quadrangle and 10-kilometer-square coordinates in which it appears. The East-West coordinates are listed first, followed by the South-North. Thus, the San Isidro Site, which appears on the Monterrey Quadrangle, has the following designation: Monterrey: 43–44/ 283–284.

The tabular presentation of the data also follows the consecutive numbering of the sites. No attempt has been made to group similar sites or site complexes. The tables are simply presentations of what was found without interpretations. However, the absence of pebble tools and other limestone artifacts in most of the sites should be noted. I have listed the projectile points by type in Table 26A. Here I have followed Sulm, Krieger and Jelks (1954). The non-projectile point part of the assemblage is given in Table 26B. These two tables are summarized by artifact class in Table 27.

Site No.	*Visited*	*Description and Location*
N. L. 1	6-18-60	Rock-shelter with extensive polychrome pictographs, largely geometric in nature. Some petroglyphs also. About ½ mile North of Rinconada. Site is just east of dry creek and railroad tracks. Monterrey: 32–33/284–285.
N. L. 2	6-24-60	Rock-shelter in the Canyon de los Reyes, about 35 kl. west of Cerralvo. Site is in a very narrow canyon about ½ mile west of the ranch of Sr. Norberto Gonzales. Nuevo Laredo: 40–41/289–290.
N. L. 3	6-27-60	Hill on northeast side of dry creek, about ¼ mile northeast of the ruins of the Harienda San Jose. The hacienda is about 2 miles west of Cienega de Flores. Top of hill is covered with burned rock, black flint flakes, and artifacts. Monterrey: 37–38/287–288.
N. L. 4	6-27-60	Collection of ceramics representing various periods made at structure in and around Hacienda San Jose.
N. L. 5	6-27-60	Small scattered burned rock area between N. L. 3 and N. L. 4.
N. L. 6	6-27-60	Burned rock concentration located about 50 yards north of the western edge of San Jose Ruins.
N. L. 7	6-27-60	Burned rock area located on low bluff about ½ mile upstream from Hacienda San Jose. Site is on south side of dry creek.
N. L. 8	6-29-60	Small area of burned rocks about 25 yards south of Highway 40, and about 0.4 miles east of 236 km. marker. Monterrey: 45–46/ 284–285.
N. L. 9	6-30-60	Area just north of Palo Blanco Ranch house, marked by small rock outcrop that seems to have eroded pictograph and scattered burned rocks. Ranch is

Site No.	*Visited*	*Description and Location*
		about 3–4 km. east of Los Ramones. Monterrey: 44–45/284–285.
N. L. 10	6-30-60	Burned rock area about 125 yards northeast of Palo Blanco ranch house on sloping ground that leads to dry creek.
N. L. 11	6-30-60	Burned rock area located about 100 yards north of 251 kl. marker on high-40. Road to Los Ramones is 1 km. east of 251 km. marker. Monterrey: 44–45/283–284.
N. L. 12	7-1-60	Area around the arroyo El Ebanito, on Rancho Los Laureles. Marked by hearths and scattered burned rock. Monterrey: 45–46/284–285.
N. L. 13	7-1-60	Extensive burned rock and hearth area on Rancho Los Laureles. Approximately 300 yards south of N. L. 12.
N. L. 14	7-1-60	Two projectile points purchased from Anselmo Pena of Los Ramones. Points said to come from Sierra Papagallos, just west of Los Ramones.
N. L. 15	7-4-60	Rock shelter in Huasteca Canyon, 18.4 miles in from Monterrey-Saltillo highway. Shelter is north of road and visible from it. Monterrey: 36–37/281–282.
N. L. 16	7-5-60	Hearth and burned rock area just below Mina La Gloria. Located about 2 km. south of Panuelo. This is just east of the southeastern border of Coahuila. Monterrey: 36–37/281–282.
N. L. 17	7-7-60	East bank of Rio San Juan, where highway 48 crosses river. Material obtained from scattered burned rock area approximately ½ mile long north of highway. Monterrey: 46–47/282–283.
N. L. 18	7-8-60	Extensive burned rock area on both sides of Arroyo Alberca, west of Garcia. Area marked by numerous hearths, some with charcoal, and abundant burned rock. Monterrey: 33–34/285–286.

Site No.	*Visited*	*Description and Location*
N. L. 19	7-12-60	Burned rock area just west of cemetery of Garcia. This areas is essentially continuous with N. L. 18.
N. L. 20	7-13-60	Burned rock area on southwest bank of river that runs along south edge of pueblo of Salinillas. Site is on sloping bank, just east of road. Monterrey: 37–38/287–288.
N. L. 21	7-13-60	Burned rock area 0.6 miles south of pueblito of El Barranco. Area covers about 30 yards, but most material concentrated on east side of road. El Barranco is on west side of Sierra de Gomas, about 28 km. southwest of Villaldama. Nuevo Laredo: 34–35/290–291.
N. L. 22	7-13-60	Burned rock area at western entrance to Canyon de Sabinas. Site is about 17 km. due west of Sabinas Hidalgo. Ruins of stone buildings in fields on both sides of road next to site. Nuevo Laredo: 34–35/293–294.
N. L. 23	7-14-60	Burned rock area on sloping bank of Rio Lajilla, located about ¼ mile southwest of where dirt road crosses the river. Site is almost 5 km. due south of Vallecillo. Nuevo Laredo: 40–41/294–295.
N. L. 24	7-14-60	Sparse area of burned rock in shallow canyon known as Las Barrancas, between 2 and 3 km. southwest of Vallecillo. Nuevo Laredo: 39–40/294–295.
N. L. 25	7-14-60	Burned rock on west bank of Sabinas River, about 100 yards north of the alberca. Road has cut through site, which is on top of bluff. Nuevo Laredo: 37–38/293–294.
N. L. 26	7-15-60	Burned rock area on east bank of Sabinas River. Material taken from area about 100 yards long, located just south of Rancho El Porvenir. Ranch is about 33

Site No.	*Visited*	*Description and Location*
		km. southeast of Vallecillo. Nuevo Laredo: 42–43/294–295.
N. L. 27	7-15-60	Very extensive area of scattered burned rock on east bank of Arroyo Las Jaras. Material taken from ¼ mile area extending from the ranch house of Rancho Mendioleno, north. Nuevo Laredo: 42–43/294–295.
N. L. 28	7-16-60	Burned rock area on eastern edge of the pueblito La Lajilla, about 8 km. southeast of Vallecillo. N. L. 41–42/294–295.
N. L. 29	7-16-60	Burned rock area on south bank of Rio Salinas, just south of Cienega de Flores. Monterrey: 38–39/286–287.
N. L. 30	7-20-60	Burned rock area on terrace of east bank of Rio Monterrey. Site is just southeast of railroad trestle at Est. San Juan, and about 17 km. southeast of Cadereyta. Monterrey: 41–42/282–283.
N. L. 31	7-21-60	Burned rock and mussel shell concentrated in area of about 30 yards diameter on eroded terrace of south bank of small creek that empties into the Rio Pesqueria. Site is about 100 yards northwest of river crossing for Highway 30. Monterrey: 38–39/285–286.
N. L. 32	7-21-60	Burned rock area on south bank of small creek that empties into Rio Pesqueria. Site is about 60 yards west of N. L. 31.
N. L. 33	7-21-60	Area of burned rock on tongue of land formed by Rio Pesqueria and small creek that empties into it from west. Mussel shell very abundant.
N. L. 34	7-21-60	Area of scattered burned rock on north bank of arroyo that runs east-west and empties into Rio Marin. Site is east of Highway 30. Monterrey: 39–40/286–287.
N. L. 35	7-21-60	Area of scattered burned rock and shell on south bank of Rio Marin. Site is east

Site No.	*Visited*	*Description and Location*
		of Highway 30. Monterrey: 39–40/286–287.
N. L. 36	7-22-60	Two stone bowls and pestles purchased from Srs. Piedad Bustillos and Ignacio Leal, both of Los Ramones. These objects supposedly come from Loma Prieta, near Ramones.
N. L. 37	8-7-60	San Isidro Site: extensive area of burned rock and hearths located on level plain south of Highway 40 and about 800 yards west of 257 km. marker. Monterrey: 43–44/283–284.
N. L. 38	8-7-60	Single hearth located on ridge north of N. L. 37. Hearth is about 175 yards northeast of grass-roofed shack on top of the hill.
N. L. 39	8-24-60	Hearth on north slope of hill on which N. L. 38 is located. Site is about 40 yards west of dirt road to Los Ramones.
N. L. 40	8-24-60	Area of burned rock located about 30 yards north of Highway 40, at approximately 251.5 km. Monterrey: 44–45/283–284.
N. L. 41	8-24–60	Burned rock area located along shallow arroyo near old house and stone table. This is approximately 1.5 km. north of cantina on north side of Highway 40, about 0.5 km. east of km. 238. Monterrey: 45–46/284–285.
N. L. 42	8-25-60	Burned rock area on north bank of Arroyo Ayancual, west of tubular steel bridge; site named La Punitita Negra. Monterrey: 43–44/283–284.
N. L. 43	8-25-60	Area on south bank of Arroyo Ayancual, about 200–300 yards downstream from N. L. 42. Collection taken from arroyo walls, which contain charcoal.

TABLE 26A

Projectile Point Types from Nuevo Leon Sites Discovered in 1960

Site # Nuevo Leon	Pasitas	Clifton	Perdiz	Toyah	Maud	Misc. Arrow	Matamoros	Nogales	Tortugas	Catan	Abasolo	Marcos-Like	Palmillas	Kent	Gary	Shumla	Unnamed Lanceolate	Plainview	Lerma	Pandora	Total
1	--	--	--			--	1	--	--	1	--	--	--	--	--	--	--	--	--	--	2
2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
3	--	--	--	--	1	--	2	--	--	2	--	--	--	--	--	--	--	--	--	--	5
4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
5	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1
6	--	--	--	--	--	1	1	--	--	--	--	1	--	--	--	--	--	--	--	--	3
7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
8	--	--	--	--	--	1	2	--	--	--	--	--	--	--	--	--	--	--	--	--	3
9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
10	--	1	--	--	--	1	4	2	--	2	--	--	--	--	2	--	--	--	--	--	12
11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
13	--	--	--	--	--	--	9	1	3	9	3	--	--	--	--	1	2	--	--	--	28
14	--	--	--	--	--	--	--	--	1	--	--	--	--	--	1	--	--	--	--	--	2
15	--	--	1	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
17	--	--	--	--	--	--	1	1	--	--	--	--	--	--	--	--	--	--	--	--	2
18	--	--	--	--	--	2	--	--	--	--	--	--	--	--	--	3	--	--	--	--	5
19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	1	1	--	3
21	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1	--	--	--	--	--	2
22	--	--	--	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--	1
23	--	--	--	--	--	--	3	--	--	--	--	--	--	--	--	1	--	--	--	--	4
24	--	--	--	--	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	2
25	--	--	--	1	--	1	--	--	--	--	--	--	--	1	--	1	--	--	--	--	5
26	--	--	--	--	--	--	7	2	2	5	--	1	1	--	1	2	--	--	--	--	21
27	--	1	--	--	--	--	11	3	1	9	7	--	2	--	1	--	--	--	--	--	35
28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
30	--	--	--	--	--	--	4	4	1	1	1	--	--	--	--	--	--	--	--	--	11
31	--	--	--	--	--	--	2	--	--	1	--	--	--	--	--	--	1	--	--	--	4
32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	--	1
33	--	--	--	--	1	--	8	--	2	1	2	--	--	--	--	1	1	--	--	--	16
34	--	--	--	--	--	--	3	--	--	1	--	--	--	--	--	--	2	--	--	--	6
35	--	1	--	--	--	--	5	--	--	2	--	--	--	--	--	--	--	--	--	--	8
36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
37	--	--	--	--	--	--	2	--	--	--	--	--	--	--	1	--	--	4	1	4	12
38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0
41	--	--	--	--	--	--	8	2	--	7	2	--	--	--	--	--	--	--	--	--	19
42	--	--	--	--	--	--	5	1	--	5	1	--	--	--	--	--	--	--	--	--	12
43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	--	--	--	1
Total	1	3	1	1	2	7	81	17	10	47	16	2	3	1	8	12	7	5	2	4	230

TABLE 26B

Artifacts from Nuevo Leon Sites Discovered in 1960

THINNED BIFACES

Nuevo Leon Sites	Unifacial C.F. Gouge	Bifacial C.F. Gouges	Large Oval Biface	Large Triang. Biface	Crescentic Bifaces	Fragments
1	--	--	--	--	--	1
2	--	--	--	--	--	--
3	--	--	2	--	--	1
4	--	--	--	--	--	--
5	--	--	--	--	--	--
6	--	--	1	--	--	--
7	--	--	--	--	--	--
8	--	--	2	--	--	1
9	--	--	--	--	--	1
10	--	--	3	--	--	1
11	--	--	--	--	--	--
12	--	--	--	--	--	--
13	38	2	3	2	--	10
14	--	--	--	--	--	--
15	--	--	1	--	--	--
16	--	--	--	--	--	1
17	--	--	1	--	1	1
18	--	--	--	--	--	7
19	--	--	--	--	2	2
20	--	--	1	--	--	1
21	--	--	1	--	--	4
22	--	--	--	--	--	2
23	--	--	1	--	--	2
24	--	--	--	--	--	1
25	--	--	1	--	--	--
26	--	--	3	--	--	10
27	--	--	--	1	--	12
28	--	--	--	--	--	--
29	--	--	--	--	--	--
30	--	--	--	--	--	4
31	--	--	--	--	--	--
32	--	--	--	--	--	2
33	--	--	2	--	--	9
34	--	--	--	--	--	3
35	--	--	1	1	--	9
36	--	--	--	--	--	--
37	2	2	--	--	--	1
38	--	--	--	--	--	--
39	--	--	--	--	--	--
40	--	--	--	--	--	--
41	--	--	4	1	--	5
42	--	--	2	--	--	12
43	--	--	1	--	--	--

TABLE 26B

Artifacts from Nuevo Leon Sites Discovered in 1960

UNIFACES

Nuevo Leon Sites	Flat Scraping Plane	Domed Scraping Plane	Keeled Scraper	Spoke Shaver Aver.	Retouched Flakes
1	--	--	--	--	--
2	--	--	--	--	1
3	--	--	--	--	1
4	--	--	--	--	--
5	--	--	--	--	--
6	--	--	--	1	1
7	--	--	--	--	--
8	--	--	--	--	--
9	--	--	--	--	--
10	1	--	--	--	--
11	--	1	--	--	1
12	--	--	--	--	--
13	--	--	--	--	4
14	--	--	--	--	--
15	--	--	--	--	--
16	1	--	--	--	1
17	--	--	--	--	1
18	--	--	--	--	1
19	1	--	--	2	3
20	--	--	--	--	--
21	--	--	--	--	1
22	--	--	--	--	--
23	--	--	--	--	1
24	--	--	--	--	2
25	--	--	--	--	4
26	--	--	--	--	2
27	--	--	--	1	1
28	--	--	--	--	--
29	--	--	--	--	--
30	--	--	--	--	--
31	--	--	--	--	1
32	--	--	--	--	1
33	--	--	--	--	--
34	--	--	--	--	1
35	--	--	--	--	--
36	--	--	--	--	--
37	--	--	--	--	2
38	--	--	--	--	--
39	--	--	--	--	--
40	--	--	--	--	--
41	--	--	--	--	1
42	--	--	--	--	2
43	--	--	--	--	--

TABLE 26B

Artifacts from Nuevo Leon Sites Discovered in 1960

PERCUSSION BIFACES

Nuevo Leon Sites	Small	Medium	Large Round/A	Large Pointed/A	Large Oval Rect/A	Pebble-Bif. Transition/A	Misc. Large/A	Frag-ments
1	--	--	--	--	--	--	--	--
2	1	--	--	--	--	--	--	--
3	4	--	--	--	--	--	--	1
4	1	1	--	--	--	1	--	--
5	--	--	--	--	--	--	--	--
6	3	--	--	--	--	--	--	1
7	4	1	--	--	--	--	--	3
8	3	--	--	--	--	1	--	--
9	--	--	--	--	--	--	--	--
10	1	--	--	--	--	--	--	--
11	--	3	--	--	--	--	--	--
12	2	--	--	--	--	--	--	--
13	7	5	--	10	1	1	--	1
14	--	--	--	--	--	--	--	--
15	2	1	--	--	1	--	--	--
16	--	--	--	--	--	--	--	1
17	--	--	--	--	--	--	--	--
18	--	--	--	--	--	--	--	--
19	1	--	--	--	--	--	--	--
20	1	1	--	--	--	--	--	1
21	1	--	--	--	--	--	--	6
22	1	--	--	--	--	--	--	--
23	5	3	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--
25	1	--	--	--	--	--	--	1
26	3	4	--	--	--	--	--	4
27	9	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--
30	--	--	--	--	--	--	--	--
31	1	--	--	--	--	--	--	--
32	--	--	--	--	--	--	--	--
33	--	--	--	--	--	--	--	4
34	--	--	--	--	--	--	--	2
35	4	3	--	--	--	--	--	6
36	--	--	--	--	--	--	--	--
37	2	7	8	9	21	15	4	2
38	--	--	--	--	2	--	1	--
39	--	--	--	--	1	--	--	--
40	--	1	--	1	--	1	--	--
41	6	2	--	1	--	1	--	1
42	--	1	--	--	--	1	--	--
43	--	--	--	1	--	--	--	--

A = Artifacts of Limestone (Silicified)

TABLE 26B

Artifacts from Nuevo Leon Sites Discovered in 1960

PEBBLE TOOLS

Nuevo Leon Sites	Unifacial /A	Bifacial /A	Core Like /A	Misc. /A
1	--	--	--	--
2	--	--	--	--
3	--	--	--	--
4	--	--	--	--
5	--	--	--	--
6	--	--	--	--
7	--	--	--	--
8	--	--	--	--
9	--	--	--	--
10	--	--	--	--
11	--	--	--	--
12	--	--	--	--
13	2	1	1	2
14	--	--	--	--
15	--	--	--	--
16	--	--	--	--
17	--	--	--	--
18	--	--	--	--
19	--	--	--	--
20	--	--	--	--
21	--	--	--	1
22	--	--	--	--
23	--	--	--	--
24	--	--	--	--
25	--	--	--	--
26	--	--	--	--
27	--	--	--	--
28	--	--	--	--
29	--	--	--	--
30	--	--	--	--
31	--	--	--	--
32	--	--	--	--
33	--	--	--	--
34	--	--	--	--
35	--	--	--	--
36	--	--	--	--
37	4	52	4	--
38	--	--	--	--
39	--	--	--	--
40	--	1	1	--
41	--	1	--	--
42	2	4	2	1
43	1	2	--	--

TABLE 27

Distribution of Artifacts, by Class, from Nuevo Leon Sites Discovered in 1960

Nuevo Leon Sites	Projectile Points	Misc. Thinned Bifaces	Percussion Bifaces	Pebble Tools	Unifaces	Total
1	2	1	0	0	0	3
2	0	0	1	0	1	2
3	5	3	5	0	1	14
4	0	0	3	0	0	3
5	1	0	0	0	0	1
6	3	1	4	0	2	10
7	0	0	8	0	0	8
8	3	3	4	0	0	10
9	0	1	0	0	0	1
10	12	4	1	0	1	18
11	0	0	3	0	2	5
12	0	0	2	0	0	2
13	27	55	25	6	4	117
14	2	0	0	0	0	2
15	2	1	4	0	0	7
16	1	1	1	0	2	5
17	2	3	0	0	1	6
18	5	7	0	0	1	13
19	1	2	1	0	6	10
20	3	2	3	0	0	8
21	2	5	7	1	1	16
22	1	2	1	0	0	4
23	4	3	8	0	1	16
24	2	1	0	0	2	5
25	5	1	2	0	4	12
26	21	13	11	0	2	47
27	35	13	9	0	2	59
28	0	0	0	0	0	0
29	0	0	0	0	0	0
30	11	4	0	0	0	15
31	4	0	1	0	1	6
32	1	2	0	0	1	4
33	15	11	4	0	0	30
34	6	3	2	0	1	12
35	8	11	13	0	0	32
36	0	0	0	0	0	0
37	11	5	68	60	2	146
38	0	0	3	0	0	3
39	0	0	1	0	0	1
40	0	0	3	2	0	5
41	19	10	11	1	1	42
42	12	14	2	9	2	39
43	1	1	1	3	0	6

Appendix 2

NOTES ON THE GEOLOGY OF THE SAN ISIDRO SITE

LAWRENCE WILKINSON

The San Isidro Site is located within the Gulf-Coastal physiographic province, (Murray 1961), at an approximate elevation of 750 feet above sea level. In this area there is a series of shale ridges, which are capped by a layer of boulder gravel and conglomerate. The ridges are all of the same approximate elevation, and seem to represent a desiccated alluvial plain. The ridges slope gently eastward from the base of the Sierra Madre Oriental and are separated from one another by small basins and wet-weather stream courses. The difference in height of the basins and ridges in the area of the site is on the order of 150 feet.

The drainage is poorly developed. Small gullies and arroyos run into the centers of the basins and often terminate in mud holes. In periods of heavy rainfall, the runoff is carried to the east end of the basin by gullies to the Arroyo about a mile north of the Monterrey-Reynosa Highway. The Arroyo Ayancual in turn drains into the Rio Pesqueria.

Almost all of the flat-topped hills have some steep slopes where the shales and conglomerate layers are clearly exposed, and the gullies often show the complete soil profile in their meander scarps. In the immediate area of the San Isidro Site two rather large gullies flow from the north ridge southward towards the center of the basin. One crosses the highway just east of the 257-kilometer marker; the other is west of the site, near the 259–kilometer marker. There is also another deep gully north of the highway, approximately 100 yards west of the hearth area at the site. This gully does not cross the highway.

The base rock in the San Isidro area is an eroded Upper Cretaceous shale of the Mendez group, which corresponds to the Navarro and Taylor formations in Texas (Garfias and Chapin 1949: Table facing page 132). The shale is topped by Pliocene or Pleistocene conglomerate, cemented with caliche. In places where it is freshly exposed, the Mendez shale has a dark gray color, but it weathers to a light buff. It is the parent rock of all of the present soil at the

San Isidro site. The conglomerate on top of the hills is more resistant to erosion, since it is cemented with caliche, and acts as a caprock which controls the development of the topography. It contains pebbles and boulders, with heavy concentrations of larger cobbles and smaller boulders (Lahee 1952: 36). Most of the rock types from the Sierra Madre Oriental are represented in the conglomerate by rounded cobbles of blue or gray-black silicified limestone (some patinated a deep brown color), limestone, sandstone, and black opalized chert. This conglomerate is the source of most of the material used in making the artifacts found at the San Isidro site.

It would appear that the Jurassic and Cretaceous rocks of the San Isidro area were deposited in a geosyncline, which evolved into the Sierra Madre Oriental at the end of the Mesozoic during the Laramide Revolution (Murray 1961). During the Tertiary, the mountains and the coastal plains went through several cycles of erosion and, by the end of the Pliocene, the upper Cretaceous shales of the mountains had been planed more or less level and covered with a veneer of alluvium from the mountains. During the Pleistocene, variations in precipitation and sea level rejuvenated the erosion cycle, and the Piedmont alluvial plain was dissected by additional stream erosion that produced the present topography.

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A

B

Fig. 16. A—Hearth at site N1 = 19. B—Snails on bush, San Isidro Site.

A

B

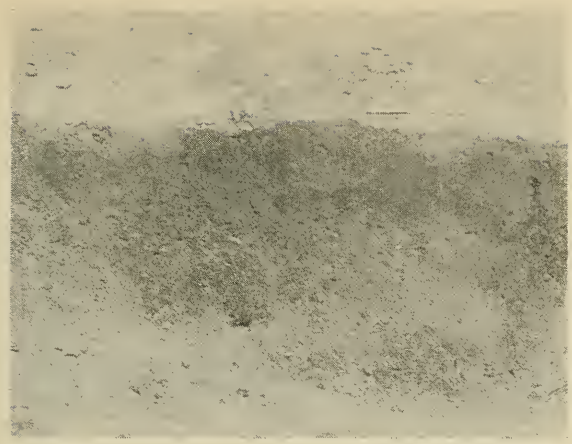
Fig. 17. A—Hearth in Area South, San Isidro Site. B—View from Northeast, start of excavation.

A

B

Fig. 18. A—Excavation of W.O trench (east trench). B—Start of excavation of squares.

PB-6555-15
5-33
C



A

B

Fig. 19. A—Profile of Square N10/WO.
B—Second Excavation Area

PB-6555-15
S-35
C

Fig. 20. Hearths in Area North.

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